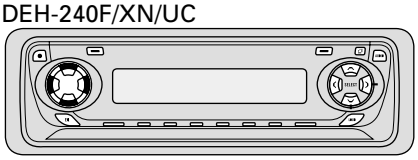
Pioneer sound.vision.soul

Service Manual

DEH-240F/XN/UC



ORDER NO.
CRT2757

HIGH POWER CD PLAYER WITH FM/AM TUNER

DEH-240F XN/UC
DEH-2400F XN/UC
DEH-24F XN/UC

COMPACT disc DIGITAL AUDIO

● This service manual should be used together with the following manual(s):

Model No.	Order No.	Mech. Module	Remarks
CX-977	CRT2624	S9	CD Mech. Module:Circuit Description, Mech.Description, Disassembly

CONTENTS

For details, refer to "Important symbols for good services" on the next page.

PIONEER CORPORATION 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153-8654, Japan
PIONEER ELECTRONICS (USA) INC. P.O.Box 1760, Long Beach, CA 90801-1760 U.S.A.
PIONEER EUROPE NV Haven 1087 Keetberglaan 1, 9120 Melsele, Belgium
PIONEER ELECTRONICS ASIACENTRE PTE.LTD. 253 Alexandra Road, #04-01, Singapore 159936

K-ZZD. NOV. 2001 Printed in Japan

[Important symbols for good services]
In this manual, the symbols shown-below indicate that adjustments, settings or cleaning should be made securely.
When you find the procedures bearing any of the symbols, be sure to fulfill them:

1. Product safety

You should conform to the regulations governing the product (safety, radio and noise, and other regulations), and should keep the safety during servicing by following the safety instructions described in this manual.

2. Adjustments

To keep the original performances of the product, optimum adjustments or specification confirmation is indispensable. In accordance with the procedures or instructions described in this manual, adjustments should be performed.

3. Cleaning

For optical pickups, tape-deck heads, lenses and mirrors used in projection monitors, and other parts requiring cleaning, proper cleaning should be performed to restore their performances.

4. Shipping mode and shipping screws

To protect the product from damages or failures that may be caused during transit, the shipping mode should be set or the shipping screws should be installed before shipping out in accordance with this manual, if necessary.

5. Lubricants, glues, and replacement parts

Appropriately applying grease or glue can maintain the product performances. But improper lubrication or applying glue may lead to failures or troubles in the product. By following the instructions in this manual, be sure to apply the prescribed grease or glue to proper portions by the appropriate amount.For replacement parts or tools, the prescribed ones should be used.

● CD Player Service Precautions

1. For pickup unit(CXX1480) handling, please refer to"Disassembly"(see page 41).
   During replacement, handling precautions shall be taken to prevent an electrostatic discharge(protection by a jumper-solder).
2. During disassembly, be sure to turn the power off since an internal IC might be destroyed when a connector is plugged or unplugged.
3. Please checking the grating after changing the pickup unit(see page 38).
4. In this product, because the memory capacity of the microcomputer is insufficient, the test mode is not installed. However grating of the pickup unit can be confirmed.

1. SAFETY INFORMATION

CAUTION

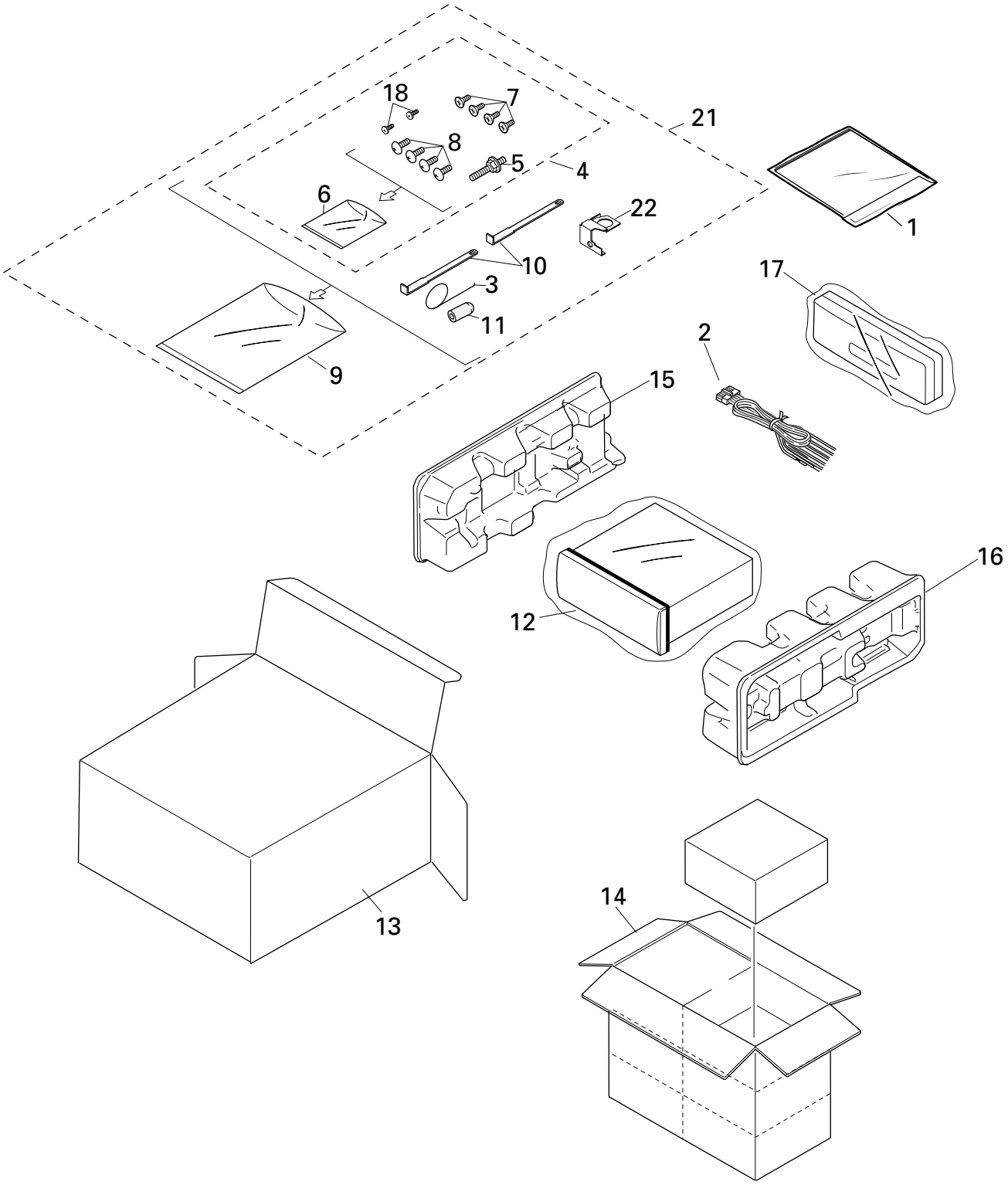
This service manual is intended for qualified service technicians; it is not meant for the casual do-it-yourselfer.
Qualified technicians have the necessary test equipment and tools, and have been trained to properly and safely repair complex products such as those covered by this manual.
Improperly performed repairs can adversely affect the safety and reliability of the product and may void the warranty. If you are not qualified to perform the repair of this product properly and safely, you should not risk trying to do so and refer the repair to a qualified service technician.

WARNING

This product contains lead in solder and certain electrical parts contain chemicals which are known to the state of California to cause cancer, birth defects or other reproductive harm.
Health & Safety Code Section 25249.6 - Proposition 65

2. EXPLODED VIEWS AND PARTS LIST

2.1 PACKING



NOTE:

- Parts marked by "*" are generally unavailable because they are not in our Master Spare Parts List.
- Screws adjacent to ∇ mark on the product are used for disassembly.
- For the applying amount of lubricants or glue, follow the instructions in this manual.
  (In the case of no amount instructions, apply as you think it appropriate.)

(1) PACKING SECTION PARTS LIST

Mark	No.	Description	Part No.
	1-1	Owner's Manual	See Contrast table(2)
	1-2	Installation Manual	See Contrast table(2)
*	1-3	Card	See Contrast table(2)
*	1-4	Warranty Card	See Contrast table(2)
	1-5	Polyethylene Bag	CEG1116
	2	Cord Assy	CDE6468
	3	Spring	CBH1650
	4	Screw Assy	CEA2796
	5	Screw	CBA1002
*	6	Polyethylene Bag	CEG-127
	7	Screw	CRZ50P090FMC
	8	Screw	TRZ50P080FMC
*	9	Polyethylene Bag	CEG-158
	10	Handle	CNC5395
	11	Bush	CNV3930
	12	Polyethylene Bag	CEG1173
	13	Carton	See Contrast table(2)
	14	Contain Box	See Contrast table(2)
	15	Protector	CHP2251
	16	Protector	CHP2252
	17	Case Assy	See Contrast table(2)
	18	Screw	BPZ20P060FZK
	19	•••••	
	20	•••••	
	21	Accessory Assy	CEA2773
	22	Earth Plate	CNC9450

(2) CONTRAST TABLE

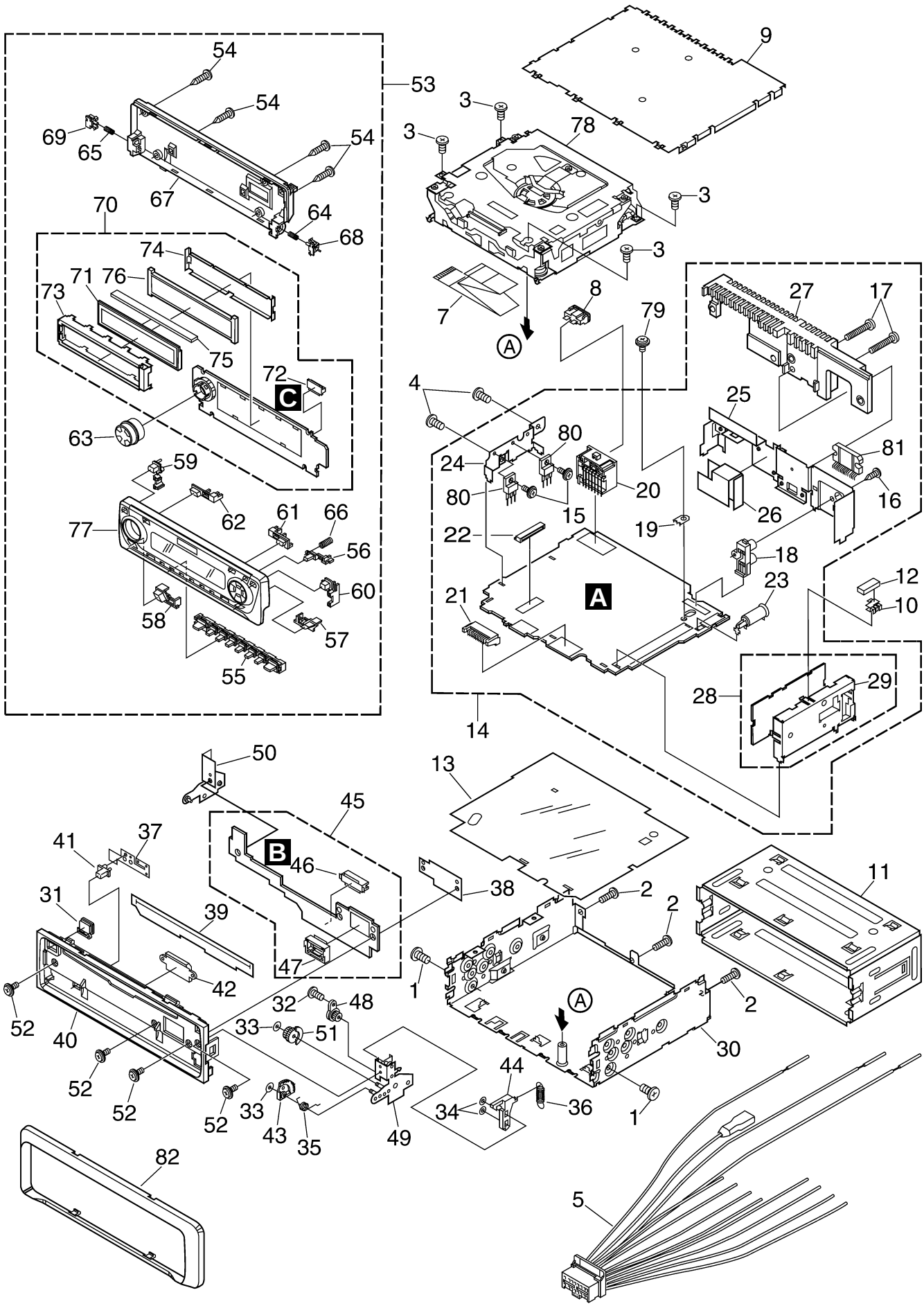
DEH-240F/XN/UC, DEH-2400F/XN/UC and DEH-24F/XN/UC are constructed the same except for the following:

Mark	No.	Symbol and Description	Part No.		
			DEH-240F/XN/UC	DEH-2400F/XN/UC	DEH-24F/XN/UC
	1-1	Owner's Manual	CRD3497	CRD3498	CRD3498
	1-2	Installation Manual	CRD3501	CRD3502	CRD3502
*	1-3	Card	Not used	ARY1048	ARY1048
*	1-4	Warranty Card	CRY1070	Not used	Not used
	13	Carton	CHG4645	CHG4643	CHG4644
	14	Contain Box	CHL4645	CHL4643	CHL4644
	17	Case Assy	CXB3520	Not used	Not used

● Owner's Manual, Installation Manual

Model	Part No.	Language
DEH-240F/XN/UC	CRD3497	English, French, Spanish
	CRD3501	
DEH-2400F/XN/UC	CRD3498	English, French, Spanish
DEH-24F/XN/UC	CRD3502	

2.2 EXTERIOR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A
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23
12
10
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29
14
50
13
45
41
37
B
46
38
2
2
11
31
39
47
42
1
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1
82
5

(1) EXTERIOR SECTION PARTS LIST

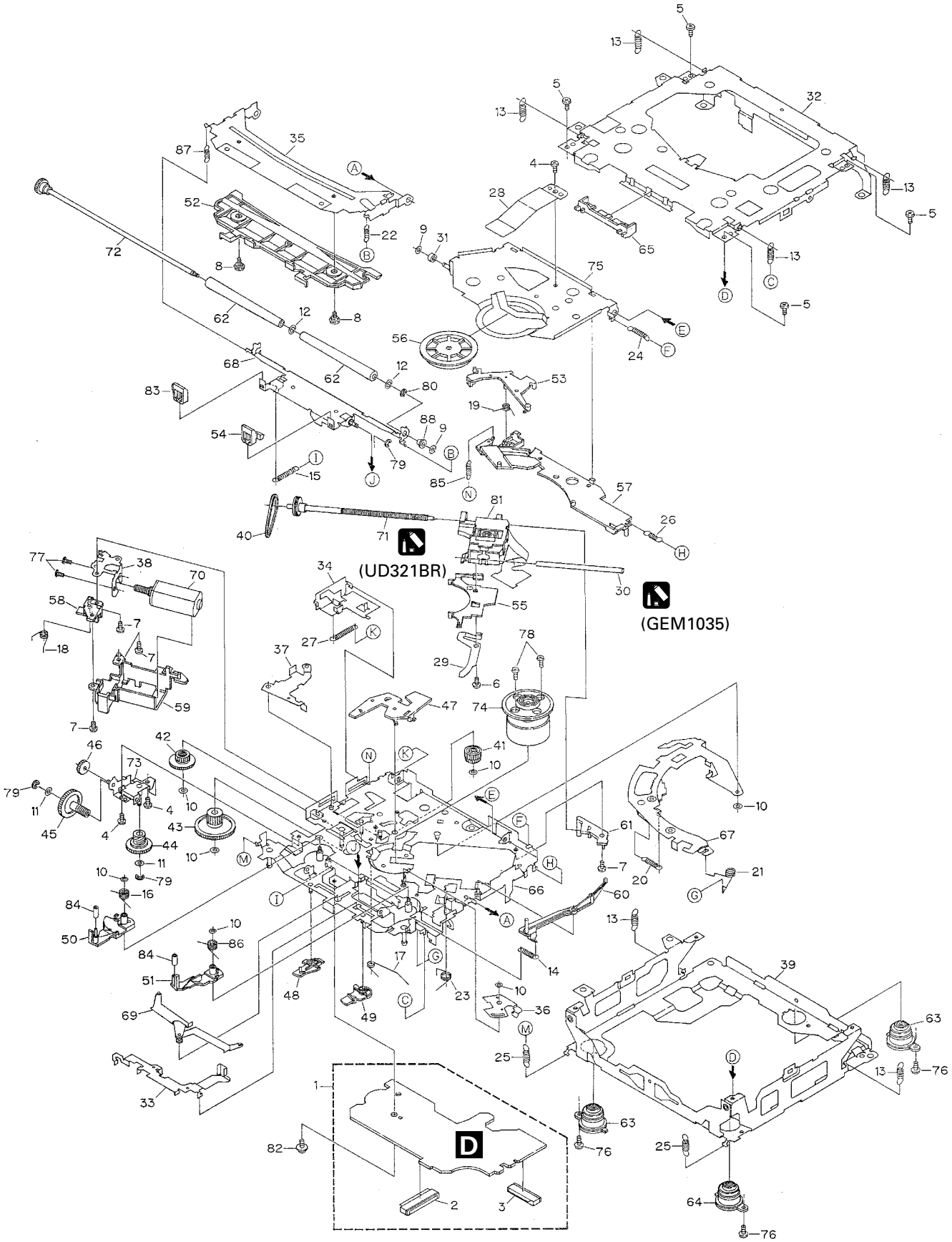
Mark No.	Description	Part No.
1	Screw	BMZ30P040FZK
2	Screw	BMZ30P100FMC
3	Screw	BSZ26P060FMC
4	Screw	BSZ30P060FMC
5	Cord Assy	CDE6468
6	•••••	
7	Cable	CDE6610
8	Fuse(10A)	CEK1136
9	Case	CNB2686
10	Holder	CNC5704
11	Holder	CNC8659
12	Cushion	CNM4870
13	Insulator	CNM6948
14	Tuner Amp Unit	CWM8319
15	Screw	ASZ26P060FMC
16	Screw	BPZ26P080FMC
17	Screw	BSZ26P160FMC
18	Pin Jack(CN351)	CKB1028
19	Terminal(CN404)	CKF1059
20	Plug(CN901)	CKM1330
21	Plug(CN750)	CKS3537
22	Connector(CN501)	CKS3835
23	Antenna Jack(CN402)	CKX1056
24	Holder	CNC8615
25	Holder	CNC9619
26	Insulator	CNM6949
27	Heat Sink	CNR1614
28	FM/AM Tuner Unit	CWE1563
29	Holder	CNC8815
30	Chassis Unit	CXB6100
31	Button(EJECT)	CAC6839
32	Screw(M2x2)	CBA1176
33	Washer	CBF1038
34	Washer	CBF1039
35	Spring	CBH2428
36	Spring	CBH2429
37	Spring	CBL1512
38	Holder	CNC9096
39	Cover	CNM6854
40	Panel	CNS6278
41	Pin	CNV6486
42	Lighting Conductor	CNV6487
43	Gear	CNV6507
44	Arm	CNV6508
45	Panel Unit	CWM7375
46	Socket(CN1950)	CKS3550
47	Connector(CN1951)	CKS4206
48	Damper Unit	CXB5070
49	Holder Unit	CXB6356
50	Holder Unit	CXB6357
51	Clutch Unit	CXB6358
52	Screw	IMS20P045FZK
53	Detach Grille Assy	See Contrast table(2)
54	Screw	BPZ20P100FZK
55	Button(1-6)	CAC7225
56	Button(OPEN)	CAC7227
57	Button(LOUD)	CAC7229
58	Button(EQ)	CAC7231
59	Button(CLOCK)	CAC7233
60	Button(AUDIO)	CAC7234
61	Button(LOCAL)	CAC7235
62	Button(BSM)	CAC7236
63	Knob	CAC7527
64	Spring	CBH2430
65	Spring	CBH2431
66	Spring	CBH2630
67	Cover	CNS6740
68	Holder	CNV6505
69	Holder	CNV6506
70	Keyboard Unit	See Contrast table(2)
71	LCD	See Contrast table(2)
72	Connector(CN1901)	CKS4524
73	Holder	CNC9757
74	Sheet	CNM7647
75	Connector	CNV6440
76	Lighting Conductor	CNV7244
77	Sub Grille Assy	See Contrast table(2)
78	CD Mechanism Module(S9ANA)	CXK5501
79	Screw	ISS26P055FUC
80	Transistor(Q510,910)	2SD2396
81	IC(IC361)	TDA7386
82	Panel	CNS6332

(2) CONTRAST TABLE

DEH-240F/XN/UC, DEH-2400F/XN/UC and DEH-24F/XN/UC are constructed the same except for the following:

Mark No.	Symbol and Description	Part No.		
		DEH-240F/XN/UC	DEH-2400F/XN/UC	DEH-24F/XN/UC
53	Detach Grille Assy	CXB8786	CXB8784	CXB8785
70	Keyboard Unit	CWM8370	CWM8370	CWM8322
71	LCD	CAW1724	CAW1724	CAW1719
77	Sub Grille Assy	CXB8792	CXB8790	CXB8791

2.3 CD MECHANISM MODULE

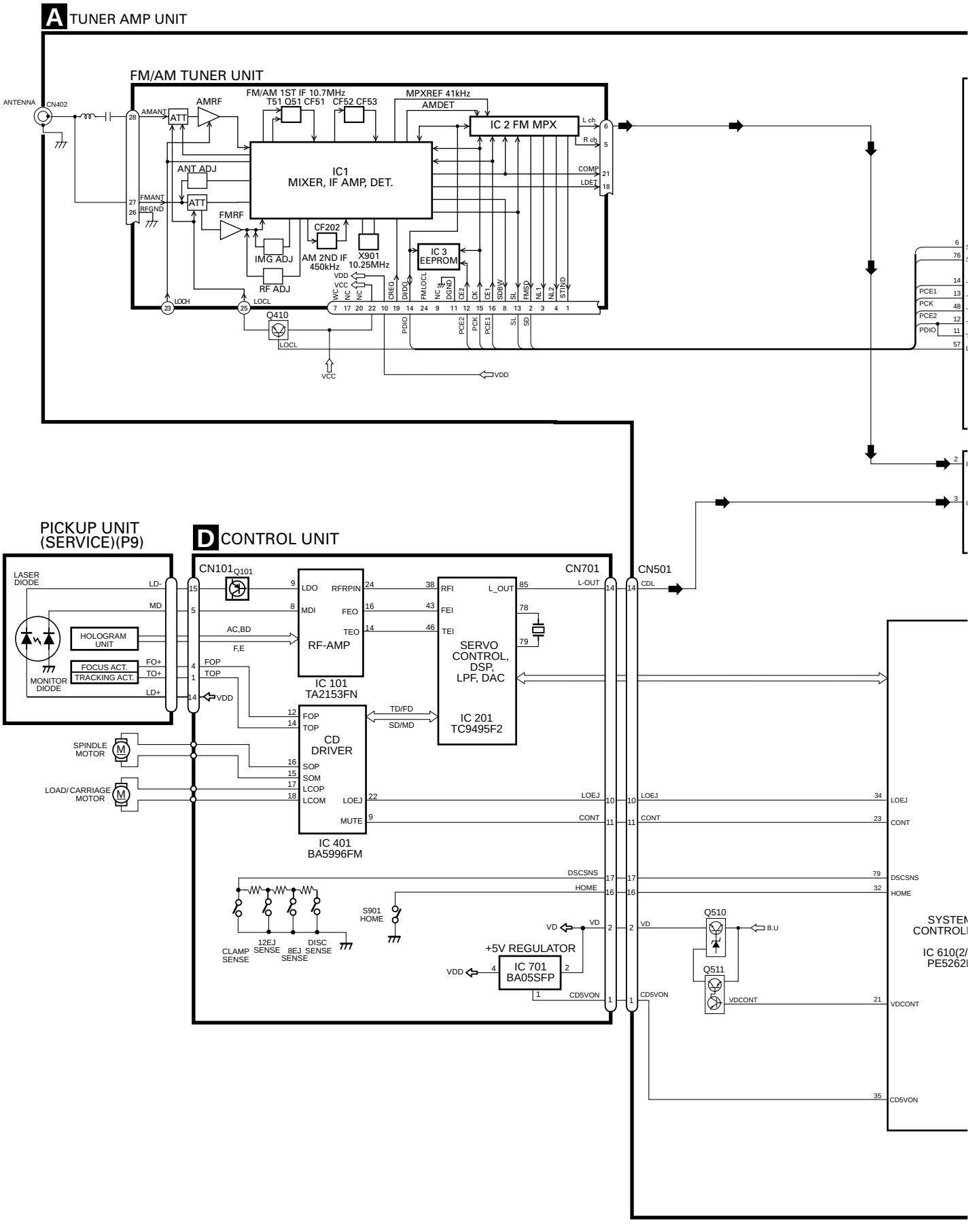


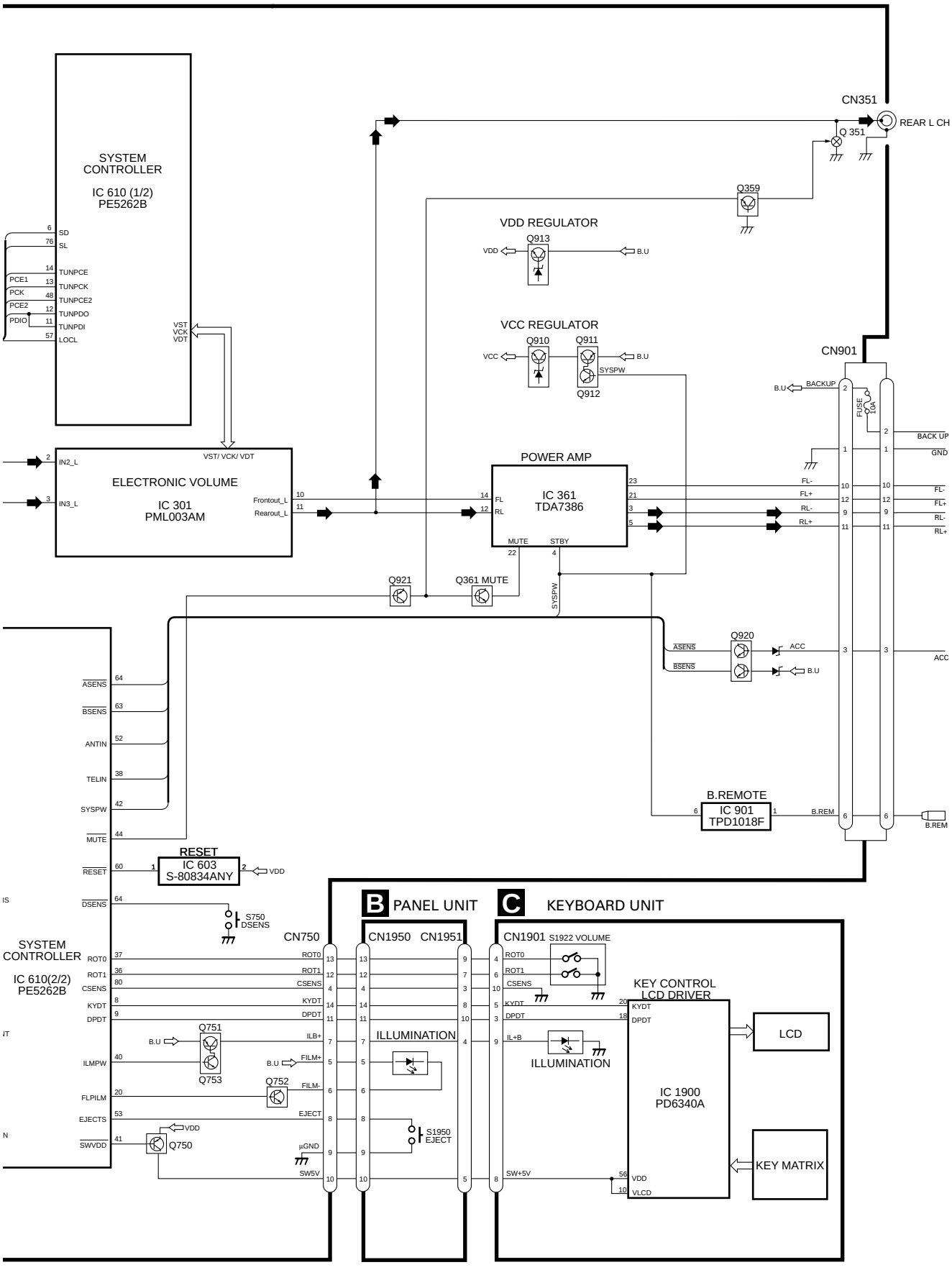
● CD MECHANISM MODULE SECTION PARTS LIST

Mark	No.	Description	Part No.
	1	Control Unit	CWX2481
	2	Connector(CN701)	CKS1959
	3	Connector(CN101)	CKS3486
	4	Screw	BMZ20P025FMC
	5	Screw	BSZ20P040FMC
	6	Screw(M2x4)	CBA1362
	7	Screw(M2x3)	CBA1527
	8	Screw	CBA1545
	9	Washer	CBF1037
	10	Washer	CBF1038
	11	Washer	CBF1039
	12	Washer	CBF1060
	13	Spring	CBH2378
	14	Spring	CBH2379
	15	Spring	CBH2514
	16	Spring	CBH2533
	17	Spring	CBH2382
	18	Spring	CBH2383
	19	Spring	CBH2384
	20	Spring	CBH2527
	21	Spring	CBH2386
	22	Spring	CBH2537
	23	Spring	CBH2390
	24	Spring	CBH2391
	25	Spring	CBH2523
	26	Spring	CBH2426
	27	Spring	CBH2444
	28	Spring	CBL1561
	29	Spring	CBL1553
	30	Shaft	CLA3845
	31	Roller	CLA3910
	32	Frame	CNC9654
	33	Lever	CNC9664
	34	Lever	CNC8949
	35	Arm	CNC9661
	36	Arm	CNC9016
	37	Arm	CNC9017
	38	Bracket	CNC9123
	39	Frame	CNC9656
	40	Belt	CNT1086
	41	Gear	CNV6886
	42	Gear	CNV6316
	43	Gear	CNV6317
	44	Gear	CNV6318
	45	Gear	CNV6319
	46	Gear	CNV6320
	47	Arm	CNV6322
	48	Arm	CNV6323
	49	Arm	CNV6324
	50	Arm	CNV6888
	51	Arm	CNV6889
	52	Guide	CNV6327
	53	Arm	CNV6924
	54	Guide	CNV6921
	55	Rack	CNV6923
	56	Clamper	CNV6331
	57	Arm	CNV6332
	58	Guide	CNV6333
	59	Cover	CNV6334
	60	Arm	CNV6335
	61	Guide	CNV6336
	62	Roller	CNV6338
	63	Damper	CNV6339
	64	Damper	CNV6340
	65	Guide	CNV6925
	66	Chassis Unit	CXB7980
*	67	Arm Unit	CXB7983
	68	Arm Unit	CXB7984
	69	Arm Unit	CXB7985
	70	Motor Unit(M2)	CXB5903
	71	Screw Unit	CXB5904
	72	Gear Unit	CXB8076
	73	Bracket Unit	CXB7982
	74	Motor Unit(M1)	CXB6007
	75	Arm Unit	CXB8504
	76	Screw(M2x5)	EBA1028
	77	Screw	JFZ20P020FMC
	78	Screw	JGZ17P020FZK
	79	Washer	YE15FUC
	80	Washer	YE20FUC
	81	Pickup Unit(Service)(P9)	CXX1480
	82	Screw	IMS26P030FMC
	83	Guide	CNV6922
	84	Roller	CNV6887
	85	Spring	CBH2509
	86	Spring	CBH2512
	87	Spring	CBH2536
	88	Collar	CNV6906

3. BLOCK DIAGRAM AND SCHEMATIC DIAGRAM

3.1 BLOCK DIAGRAM

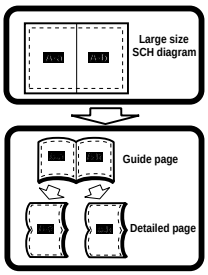


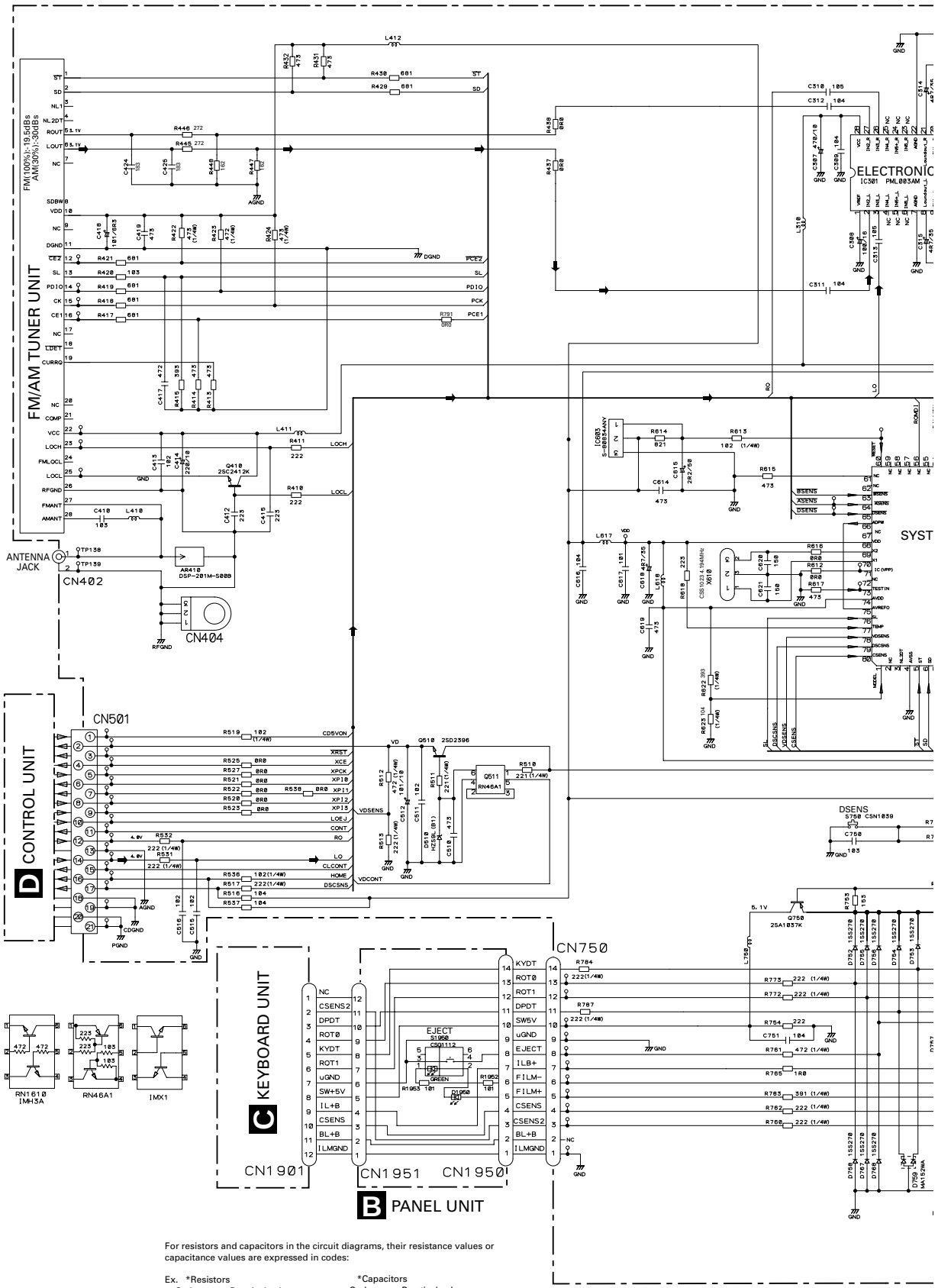

SYSTEM CONTROLLER
IC 610 (1/2)
PE5262B
SD
SL
TUNPCE
TUNPCK
TUNPCE2
TUNPDO
TUNPDI
LOCL
PCE1
PCK
PCE2
PDIO
VST
VCK
VDT
CN351
REAR L CH
Q 351
Q359
VDD REGULATOR
Q913
VDD
B.U
VCC REGULATOR
Q910
Q911
Q912
VCC
SYSPW
CN901
BACKUP
FUSE 10A
BACK UP
GND
FL-
FL+
RL-
RL+
ACC
B.REM
VST/ VCK/ VDT
IN2_L
IN3_L
ELECTRONIC VOLUME
IC 301
PML003AM
Frontout_L
Rearout_L
POWER AMP
IC 361
TDA7386
FL
RL
MUTE
STBY
Q921
Q361 MUTE
Q920
ASENS
BSENS
B.REMOTE
IC 901
TPD1018F
ANTIN
TELIN
MUTE
RESET
IC 603
S-80834ANY
DSENS
S750
DSENS
B PANEL UNIT
C KEYBOARD UNIT
CN750
CN1950
CN1951
CN1901
S1922 VOLUME
ROT0
ROT1
CSENS
KYDT
DPDT
ILB+
FILM+
FILM-
EJECT
SW5V
µGND
ILLUMINATION
S1950
EJECT
IL+B
SW+5V
KEY CONTROL
LCD DRIVER
IC 1900
PD6340A
VLCD
LCD
KEY MATRIX
Q751
Q752
Q753
Q750
ILMPW
FLPILM
EJECTS
SWVDD

3.2 OVERALL CONNECTION DIAGRAM(GUIDE PAGE)

Note: When ordering service parts, be sure to refer to "EXPLODED VIEWS AND PARTS LIST" or "ELECTRICAL PARTS LIST".

A-a



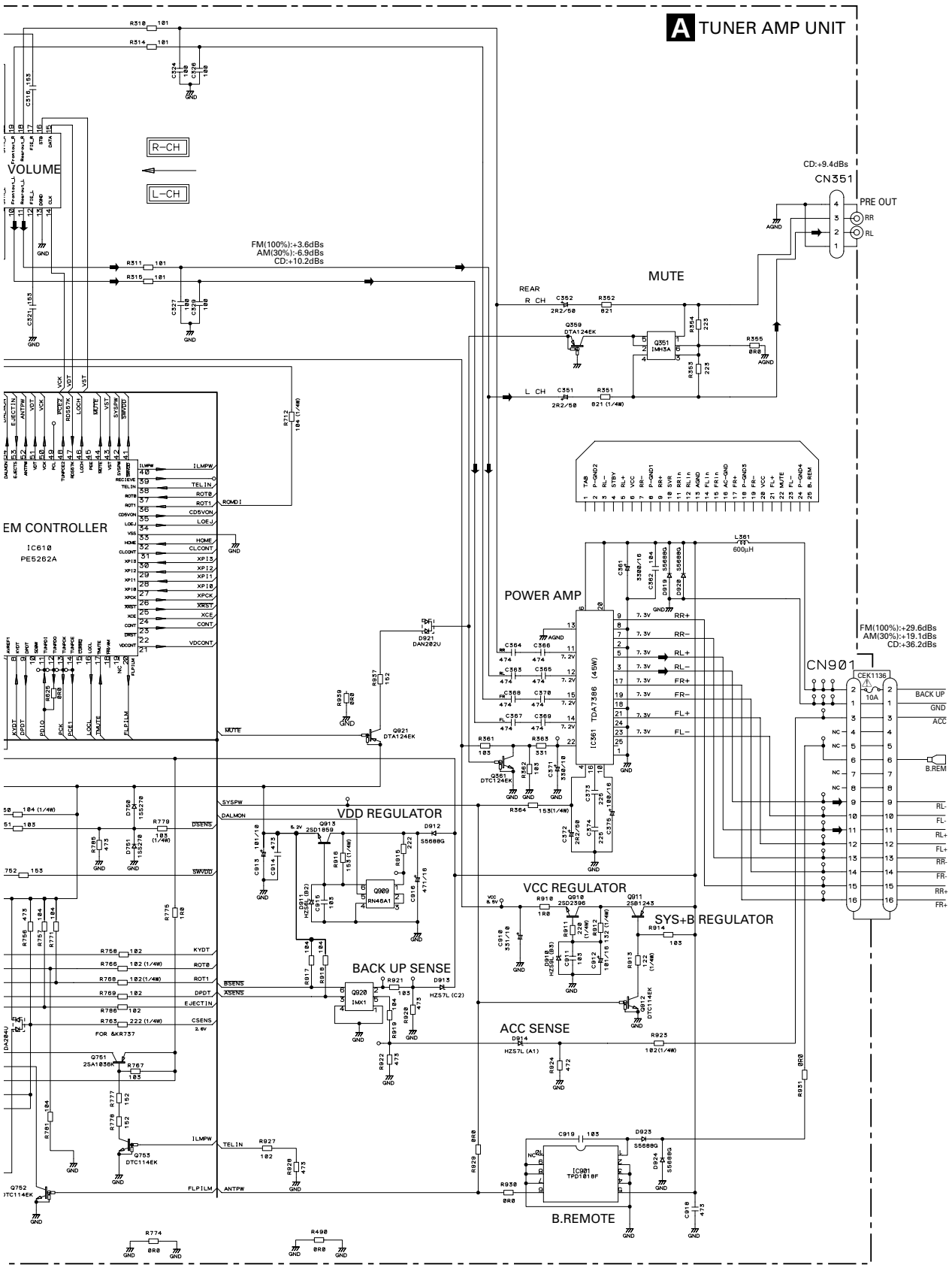


For resistors and capacitors in the circuit diagrams, their resistance values or capacitance values are expressed in codes:

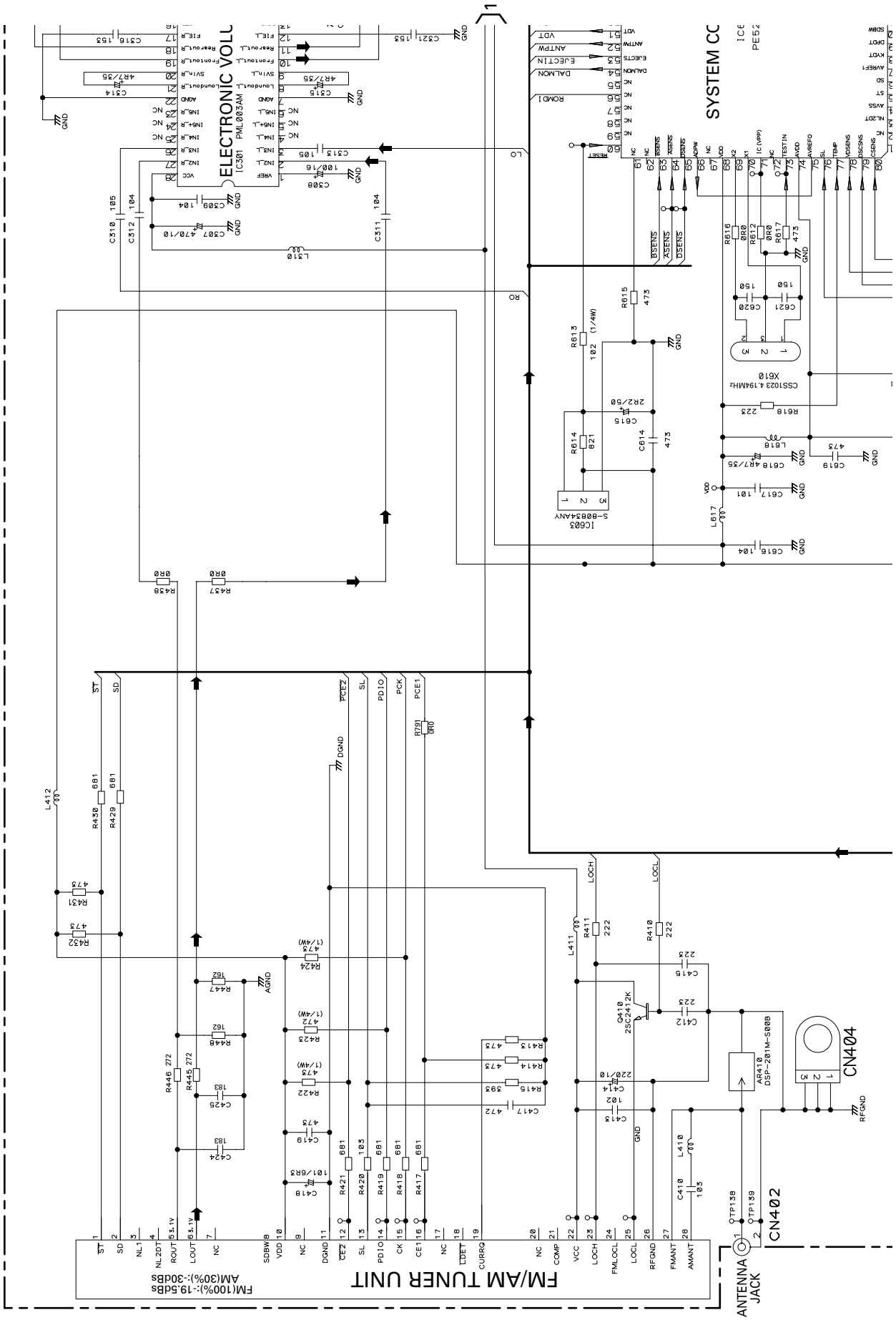
Ex. *Resistors		*Capacitors	
Code	Practical value	Code	Practical value
123	12k ohms	103	0.01uF
103	10k ohms	101/10	100uF/10V

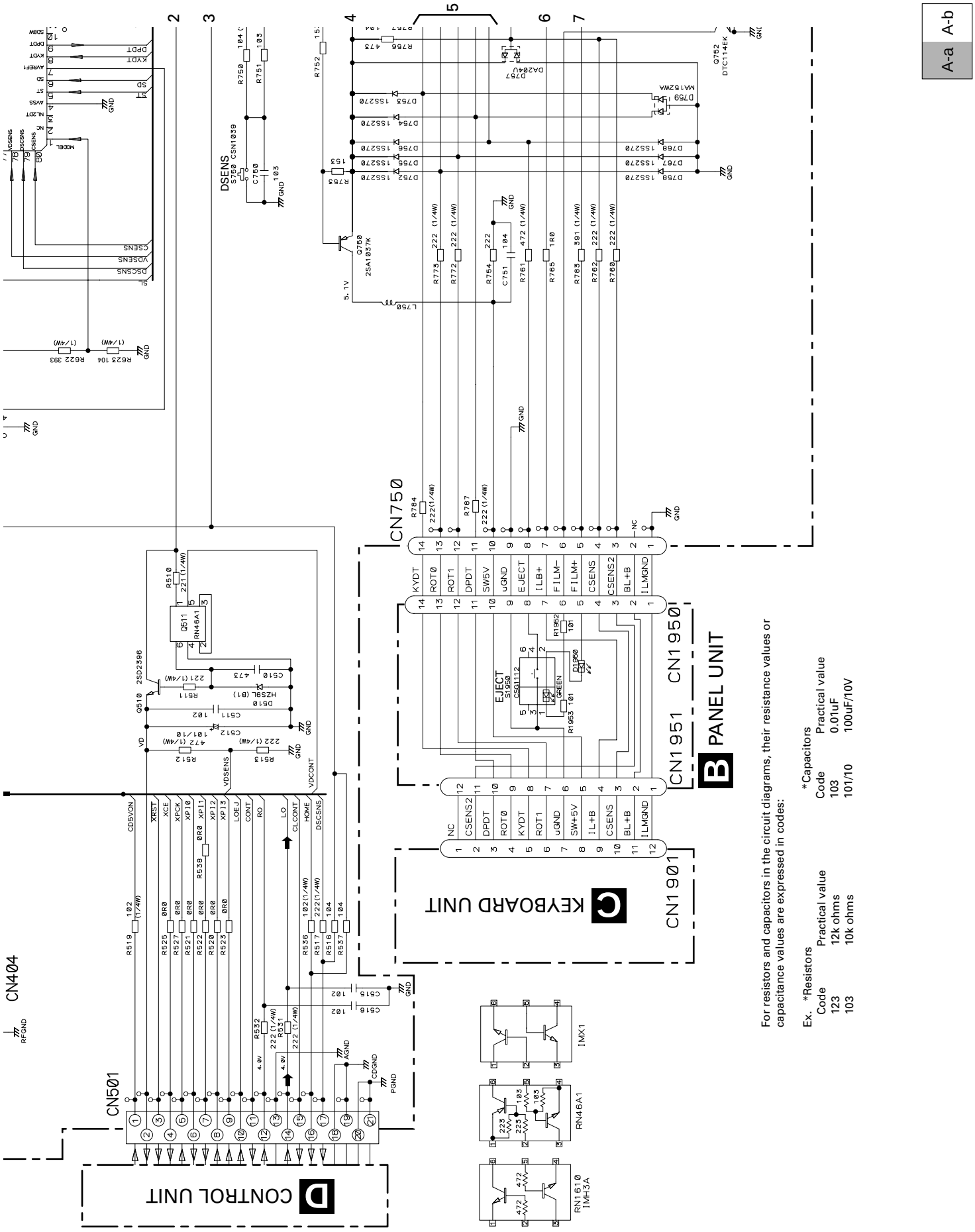
A B

A-b


A TUNER AMP UNIT
VOLUME
R-CH
L-CH
FM(100%):+3.6dBs
AM(30%):-6.9dBs
CD:+10.2dBs
MUTE
REAR
R CH
L CH
CD:+9.4dBs
CN351
PRE OUT
RR
RL
EM CONTROLLER
IC610
PE5262A
POWER AMP
IC361
TDA7386 (45W)
L361
600µH
FM(100%):+29.6dBs
AM(30%):+19.1dBs
CD:+36.2dBs
CN901
CEK1136
10A
BACK UP
GND
ACC
B.REM
RL-
FL-
RL+
FL+
RR-
FR-
RR+
FR+
VDD REGULATOR
VCC REGULATOR
SYS+B REGULATOR
BACK UP SENSE
ACC SENSE
B.REMOTE
IC901
TPD1018F

A-b
A-a


ELECTRONIC VOLL
IC301 PML0035AM
SYSTEM CC
FM/AM TUNER UNIT
FM(100%):-19.5dBs
AM(30%):-30dBs
ANTENNA JACK
CN402
CN404
IC603
S-8083AANY
X610
CSS1023 4.194MHz
Q410 2SC2412K
AE410 DSP-201M-S80B



For resistors and capacitors in the circuit diagrams, their resistance values or capacitance values are expressed in codes:

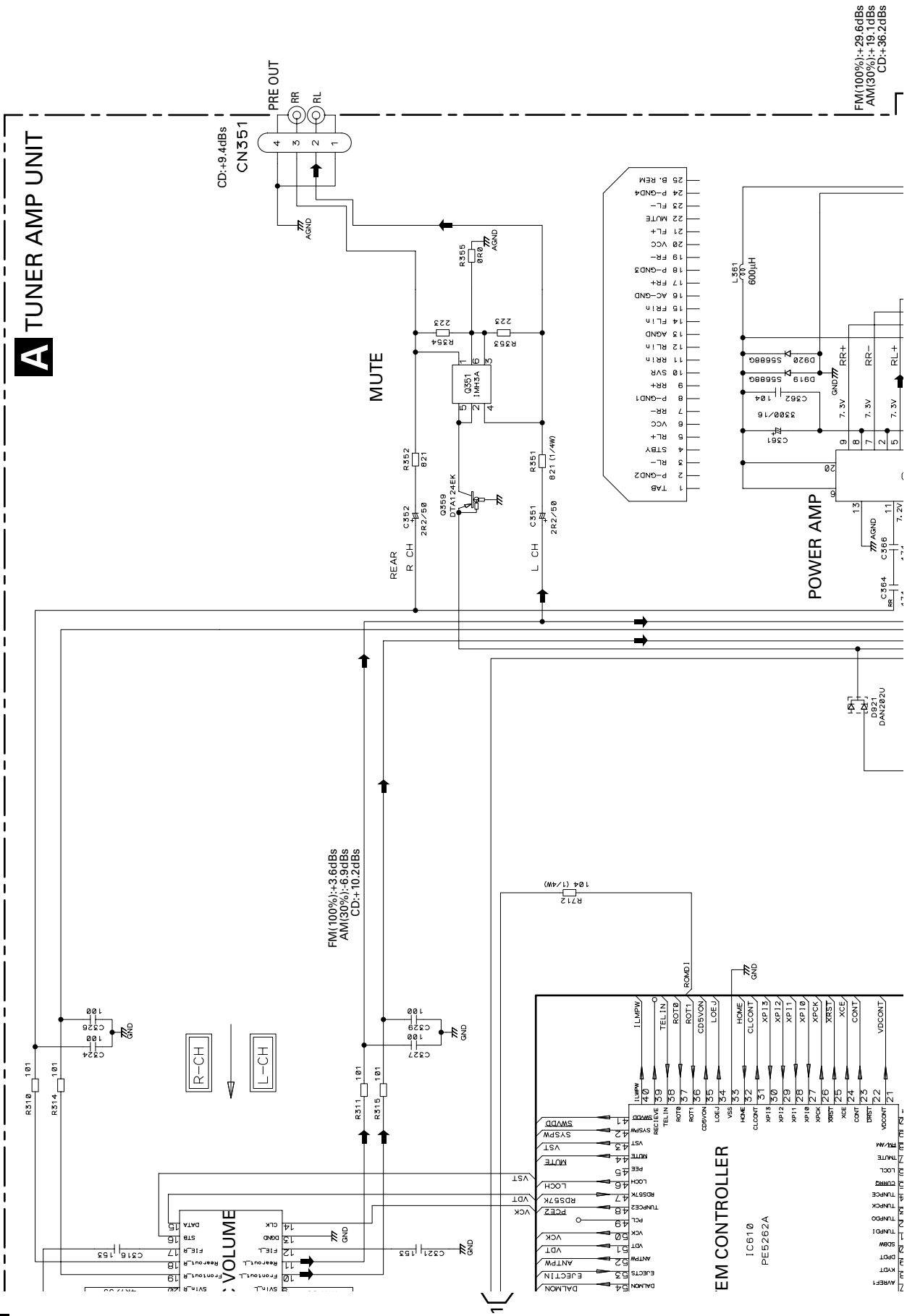
Ex. *Resistors

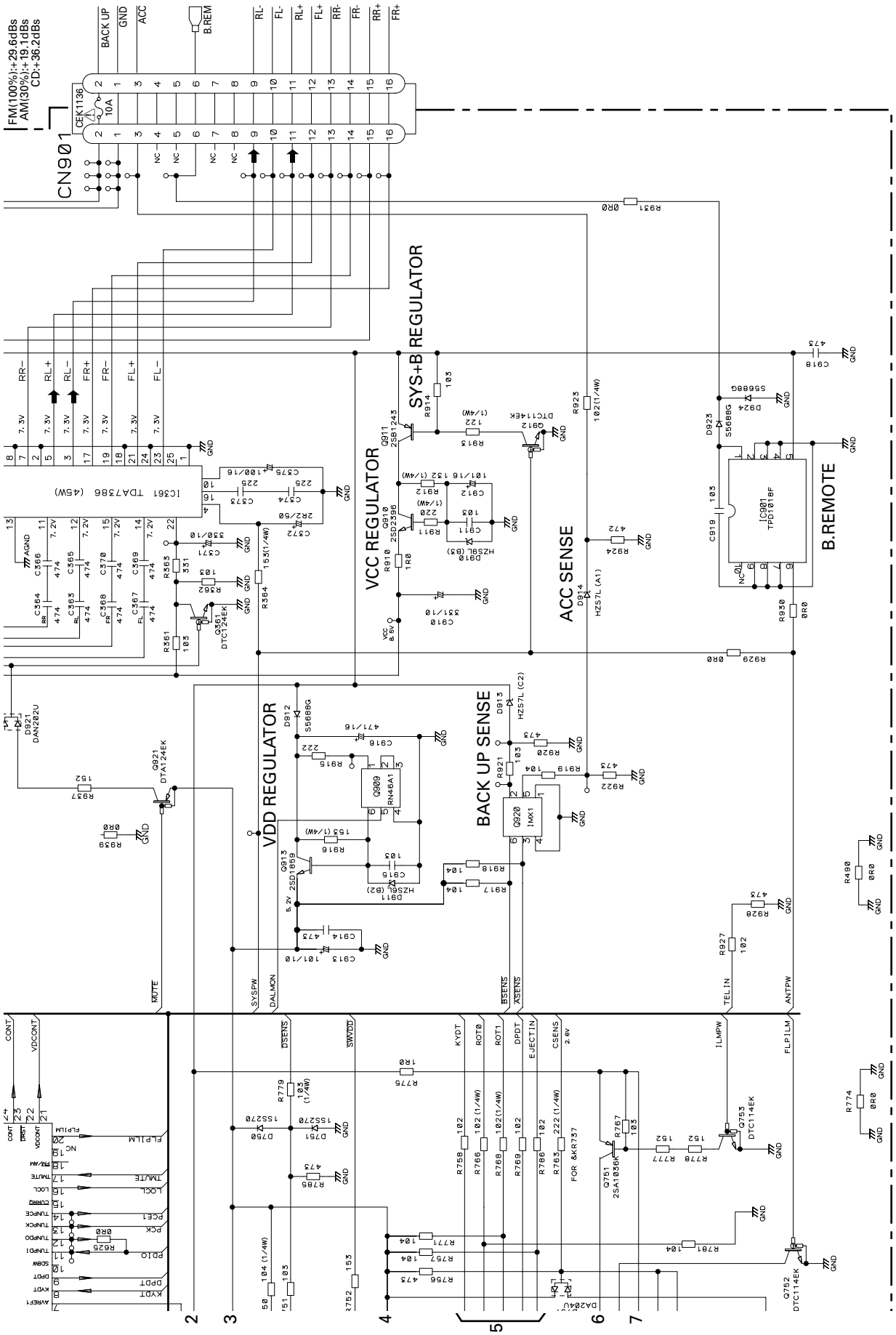
Code	Practical value
123	12k ohms
103	10k ohms

*Capacitors

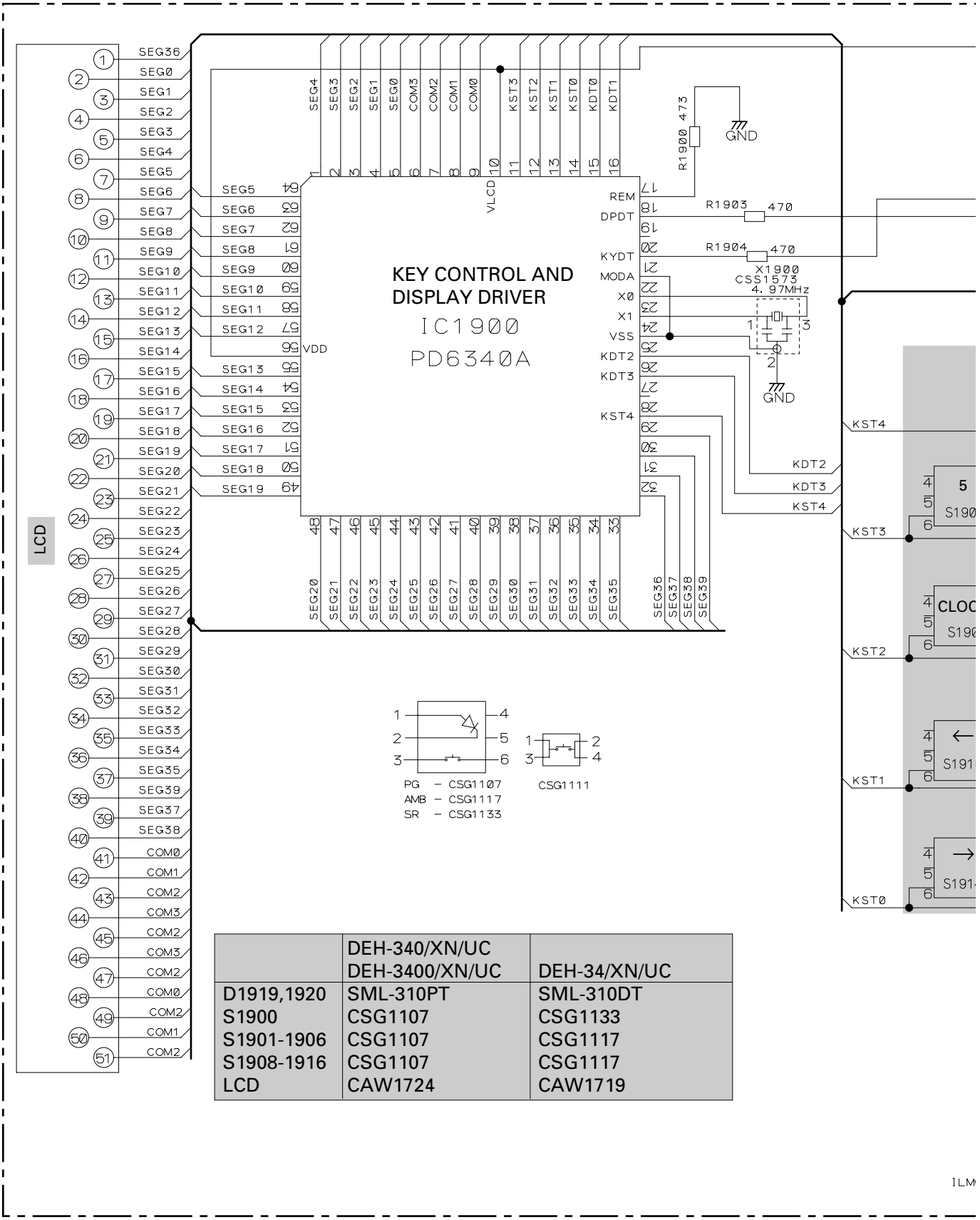
Code	Practical value
103	0.01uF
101/10	100uF/10V

A-a A-b

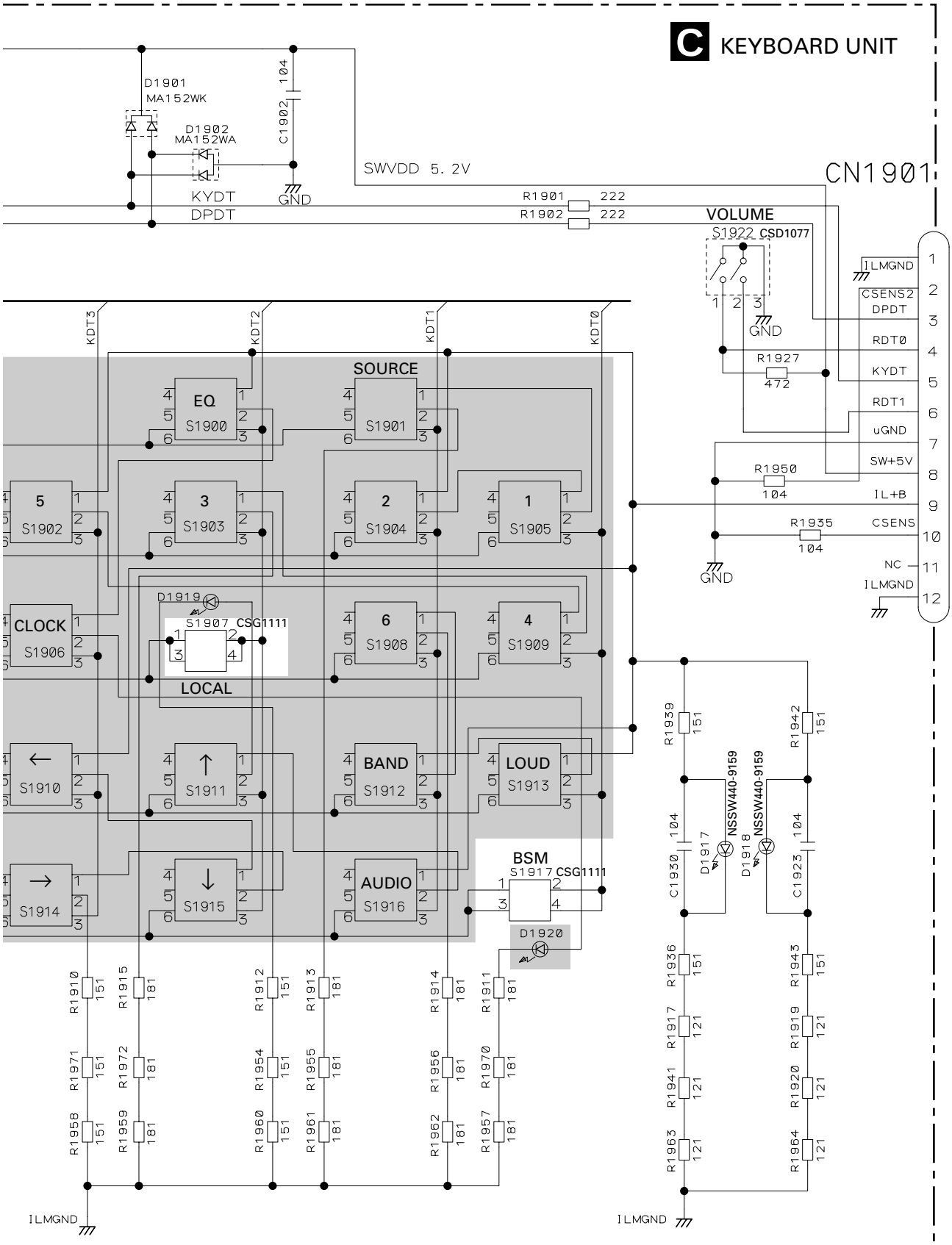

A TUNER AMP UNIT
PRE OUT
RR
RL
CD:+9.4dBs
CN351
FM(100%):+29.6dBs
AM(30%):+19.1dBs
CD:+36.2dBs
MUTE
Q351
1MH3A
Q359
DTA124EK
R352
821
R351
821 (1/4W)
C352
2R2/50
C351
2R2/50
REAR
R CH
L CH
R355
0R0
AGND
R354
22
R353
22
L361
600µH
POWER AMP
D920
S5588G
D919
S5588G
C362
104
C361
3300/16
RR+
RR-
RL+
GND
7.3V
C566
C564
D921
DAN202U
FM(100%):+3.6dBs
AM(30%):-6.9dBs
CD:+10.2dBs
R712
104 (1/4W)
R-CH
L-CH
R310
R314
R311
R315
101
C324
C326
C327
C329
100
GND
VOLUME
C316
C321
153
VST
VDT
VCK
EM CONTROLLER
IC610
PE5262A
ROMDI
CLCONT
XP13
XP12
XP11
XP10
XPCK
XRST
XCE
CONT
VDCONT
HOME
TEL IN
ROTB
ROTI
CD5VON
LOEJ
VSS
ILMPW
SWDD
SYSPW
VST
MUTE
PEF
LOCH
RDS57K
TUNPCE2
PCE2
VCK
VDT
ANTPW
EJECTIN
DALMON


CN901
CEK1136
10A
BACK UP
GND
ACC
B.REM
RL-
FL-
RL+
FL+
RR+
FR-
RR+
FR+
FM(100%):+29.6dBs
AM(30%):+19.1dBs
CD:+36.2dBs
SYS+B REGULATOR
VCC REGULATOR
ACC SENSE
B.REMOTE
VDD REGULATOR
BACK UP SENSE
IC361 TDA7386 (45W)
MUTE
SYSPW
DALMON
BSENS
ASENS
TELIN
ANTPW
CONT
VDCONT
DSENS
SWVDD
KYDT
ROT0
ROT1
DPDT
EJECTIN
CSENS
ILMPW
FLPILM

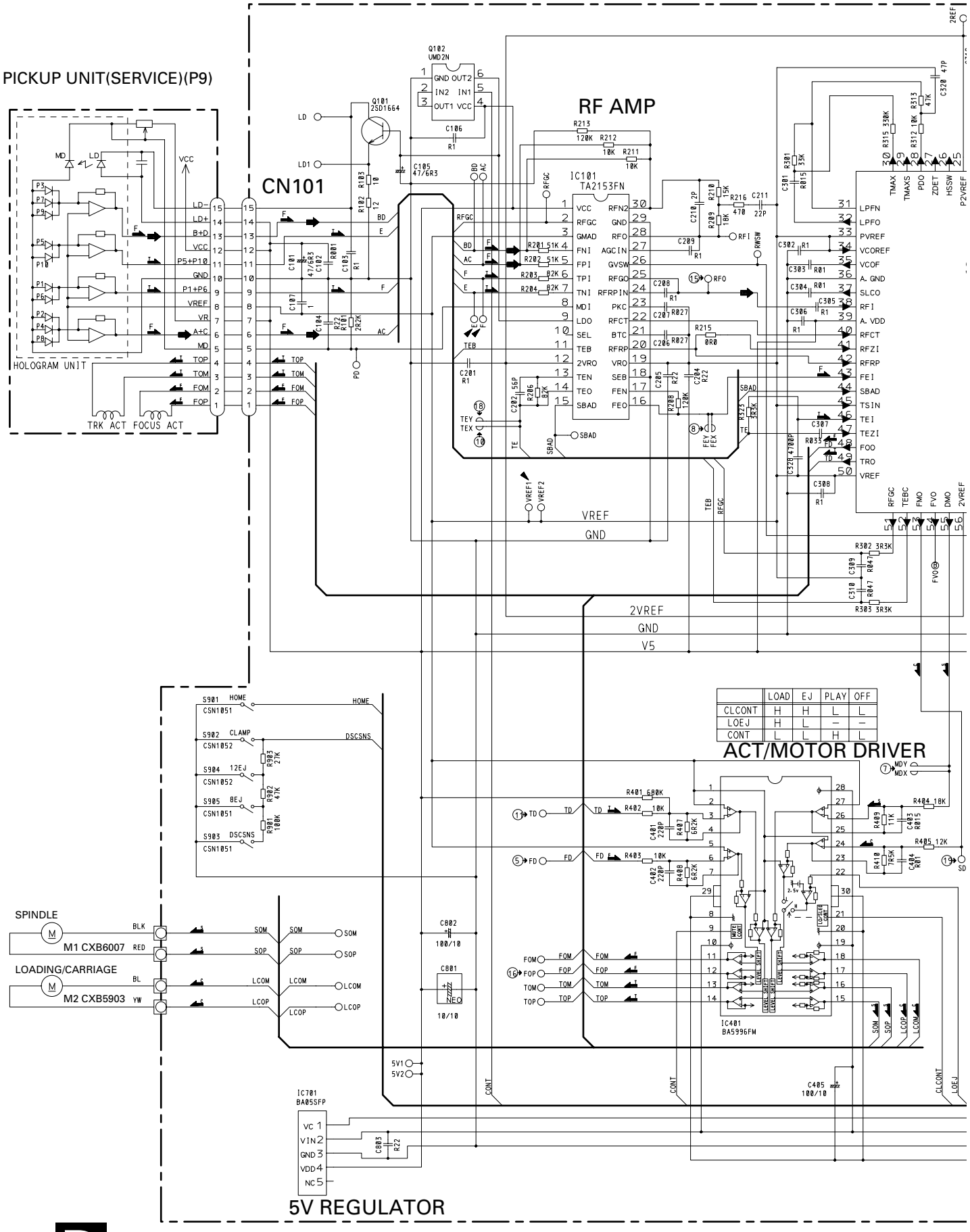
3.3 KEYBOARD UNIT

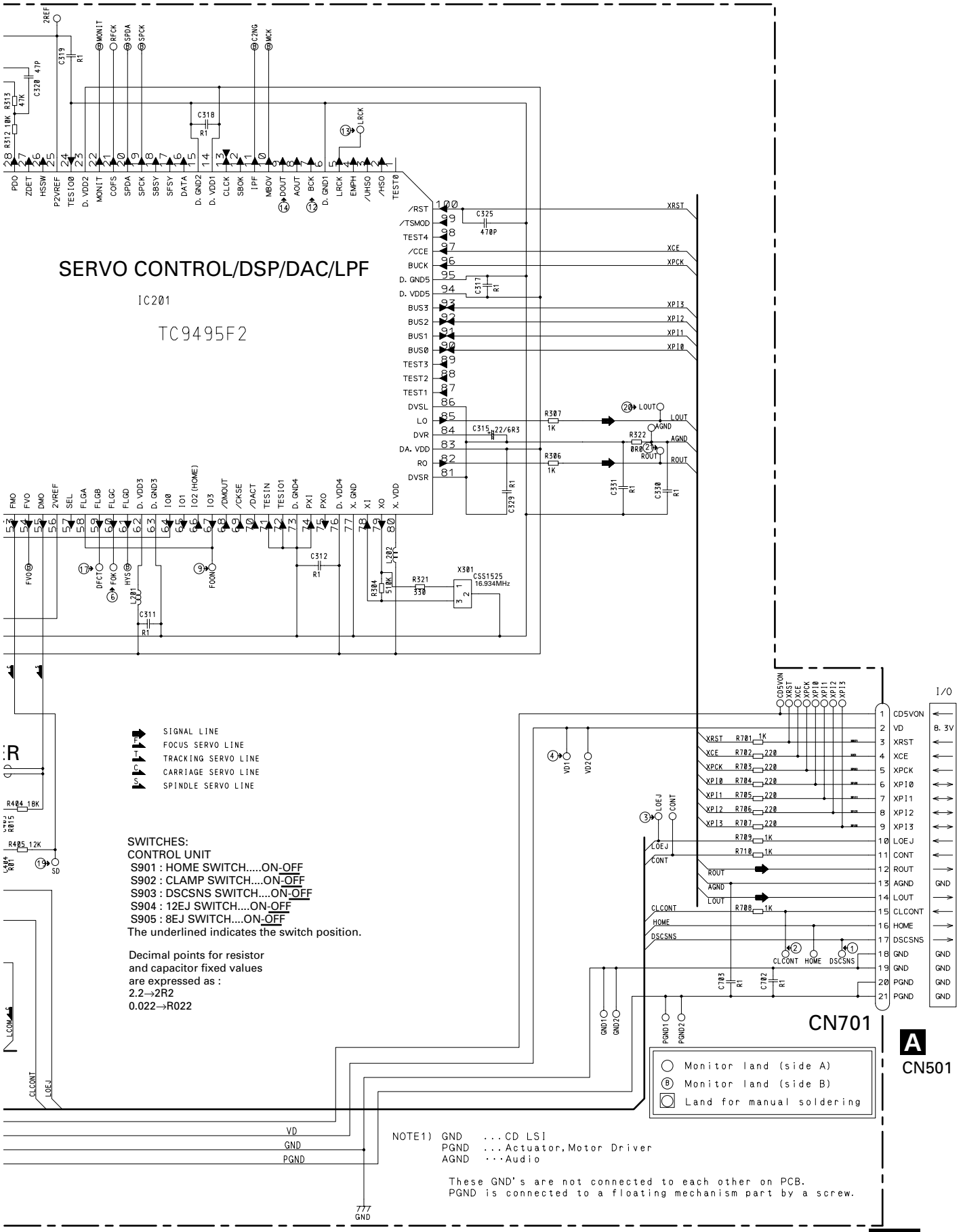


	DEH-340/XN/UC DEH-3400/XN/UC	DEH-34/XN/UC
D1919,1920	SML-310PT	SML-310DT
S1900	CSG1107	CSG1133
S1901-1906	CSG1107	CSG1117
S1908-1916	CSG1107	CSG1117
LCD	CAW1724	CAW1719


C KEYBOARD UNIT
D1901
MA152WK
D1902
MA152WA
C1902
104
KYDT
DPDT
GND
SWVDD 5. 2V
CN1901
R1901
222
R1902
222
VOLUME
S1922 CSD1077
ILMGND
CSENS2
DPDT
RDT0
KYDT
RDT1
uGND
SW+5V
IL+B
CSENS
NC
ILMGND
R1927
472
R1950
104
R1935
104
B
CN1951
KDT3
KDT2
KDT1
KDT0
SOURCE
EQ
S1900
S1901
5
S1902
3
S1903
2
S1904
1
S1905
CLOCK
S1906
D1919
S1907 CSG1111
6
S1908
4
S1909
LOCAL
S1910
S1911
BAND
S1912
LOUD
S1913
S1914
S1915
AUDIO
S1916
BSM
S1917 CSG1111
D1920
R1939
151
R1942
151
NSSW440-9159
NSSW440-9159
C1930
104
D1917
D1918
C1923
104
R1936
151
R1943
151
R1917
121
R1919
121
R1941
121
R1920
121
R1963
121
R1964
121
R1910
151
R1915
181
R1912
151
R1913
181
R1914
181
R1911
181
R1971
151
R1972
181
R1954
151
R1955
181
R1956
181
R1970
181
R1958
151
R1959
181
R1960
151
R1961
181
R1962
181
R1957
181
ILMGND
ILMGND

3.4 CD MECHANISM MODULE D CONTROL UNIT



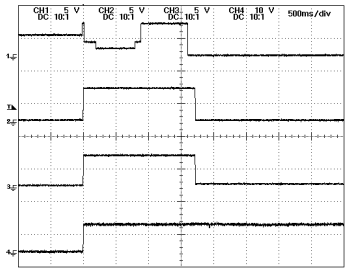

SERVO CONTROL/DSP/DAC/LPF
IC201
TC9495F2
SIGNAL LINE
FOCUS SERVO LINE
TRACKING SERVO LINE
CARRIAGE SERVO LINE
SPINDLE SERVO LINE
SWITCHES:
CONTROL UNIT
S901 : HOME SWITCH.....ON-OFF
S902 : CLAMP SWITCH....ON-OFF
S903 : DSCSNS SWITCH....ON-OFF
S904 : 12EJ SWITCH....ON-OFF
S905 : 8EJ SWITCH....ON-OFF
The underlined indicates the switch position.
Decimal points for resistor
and capacitor fixed values
are expressed as :
2.2→2R2
0.022→R022
CN701
CN501
Monitor land (side A)
Monitor land (side B)
Land for manual soldering
NOTE1) GND ...CD LSI
PGND ...Actuator,Motor Driver
AGND ···Audio
These GND's are not connected to each other on PCB.
PGND is connected to a floating mechanism part by a screw.

Note:1. The encircled numbers denote measuring pointes in the circuit diagram.
2. Reference voltage
VREF:2.1V

● Waveforms

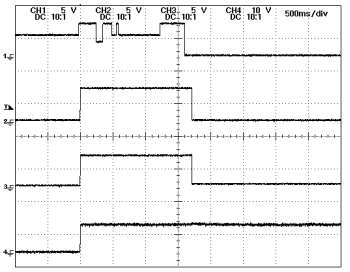
① CH1:DSCSNS 5V/div.
② CH2:CLCONT 5V/div.
③ CH3:LOEJ 5V/div. 500ms/div.
④ CH4:VD 10V/div.
When loading (12 cm CD)

Ref. : GND
Mode : Normal



① CH1:DSCSNS 5V/div.
② CH2:CLCONT 5V/div.
③ CH3:LOEJ 5V/div. 500ms/div.
④ CH4:VD 10V/div.
When loading (8 cm CD)

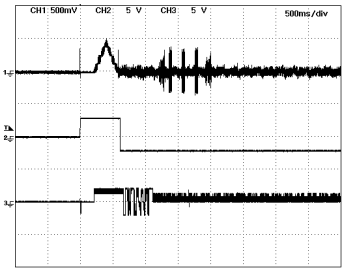
Ref. : GND
Mode : Normal



⑤ CH1:FD 500mV/div.
⑥ CH2:FOK 5V/div. 500ms/div.
⑦ CH3:MD 5V/div.

When setting up "Source On"

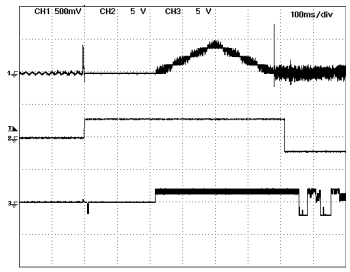
Ref. : VREF
Mode : Normal



⑤ CH1:FD 500mV/div.
⑥ CH2:FOK 5V/div. 100ms/div.
⑦ CH3:MD 5V/div.

Magnified drawing for "time"

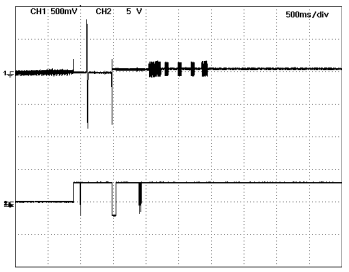
Ref. : VREF
Mode : Normal



⑧ CH1:FE 500mV/div.
⑨ CH2:FOON 5V/div. 500ms/div.

When setting up "Source On"

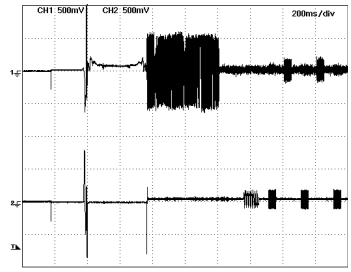
Ref. : VREF
Mode : Normal



⑩ CH1:TE 500mV/div.
⑧ CH2:FE 500mV/div. 200ms/div.

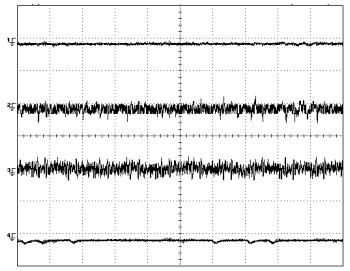
When setting up "Source On"

Ref. : VREF
Mode : Normal



⑧ CH1:FE 500mV/div.
⑤ CH2:FD 500mV/div.
⑩ CH3:TE 500mV/div. 1ms/div.
⑪ CH4:TD 500mV/div.
During "Play"

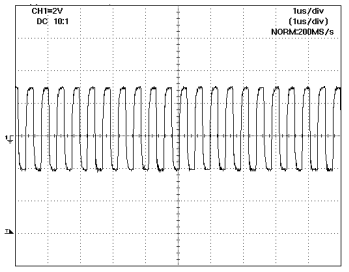
Ref. : VREF
Mode : Normal



⑫ CH1:BCK 2V/div. 1µs/div.

During "Play"

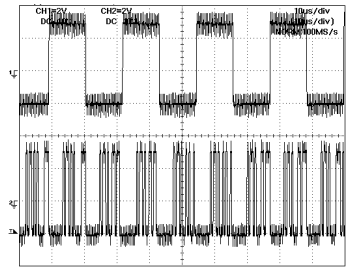
Ref. : VREF
Mode : Normal



⑬ CH1:LRCK 2V/div.
⑭ CH2:DOUT 2V/div. 10µs/div.

During "Play"

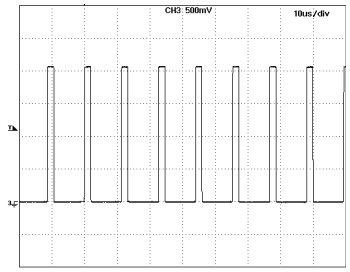
Ref. : VREF
Mode : Normal



⑦ CH1:MD 500mV/div. 10µs/div.

During "Play"

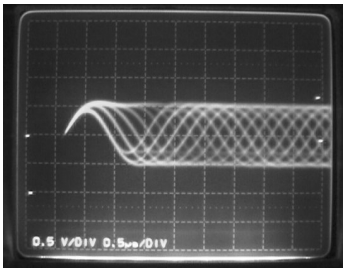
Ref. : VREF
Mode : Normal



⑮ CH1:RFO 500mV/div. 0.5µs/div.

During "Play"

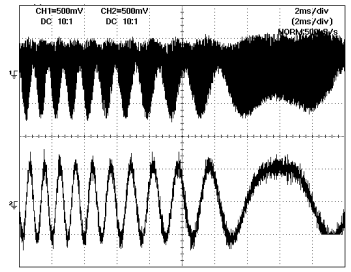
Ref. : VREF
Mode : Normal



⑮ CH1:RFO 500mV/div.
⑩ CH2:TE 500mV/div. 2ms/div.

During "Tracking Open"

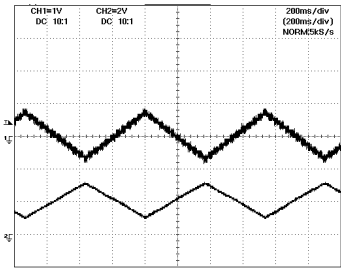
Ref. : VREF
Mode : Test



⑤ CH1:FD 1V/div.
⑯ CH2:FOP 2V/div. 200ms/div.

With no disk inserted
During "Focus Close"

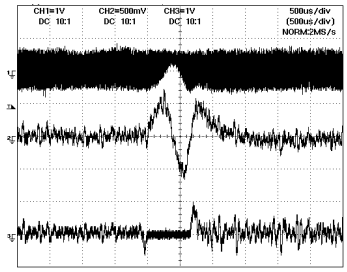
Ref. : VREF
Mode : Test



⑮ CH1:RFO 1V/div.
⑩ CH2:TE 500mV/div. 500µs/div.
⑪ CH3:TD 1V/div.

1 Track Jump

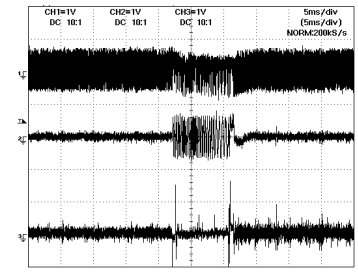
Ref. : VREF
Mode : Test



⑮ CH1:RFO 1V/div.
⑩ CH2:TE 1V/div. 5ms/div.
⑪ CH3:TD 1V/div.

32 Track Jump

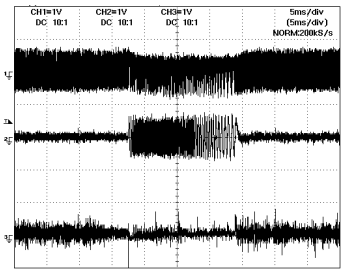
Ref. : VREF
Mode : Test



⑮ CH1:RFO 1V/div.
⑩ CH2:TE 1V/div. 5ms/div.
⑪ CH3:TD 1V/div.

100 Track Jump

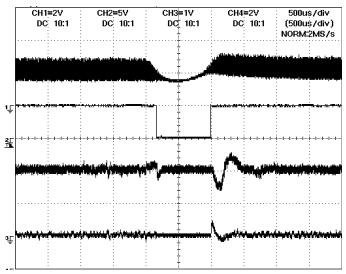
Ref. : VREF
Mode : Test



⑮ CH1:RFO 2V/div.
⑰ CH2:DFCT 5V/div. 500µs/div.
⑤ CH3:FD 1V/div.
⑪ CH4:TD 2V/div.

When reproducing black dots (800µm)

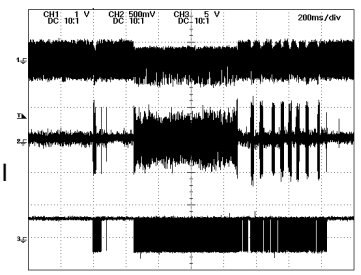
Ref. : VREF
Mode : Normal



⑮ CH1:RFO 1V/div.
⑩ CH2:TE 500mV/div. 200ms/div.
⑰ CH3:DFCT 5V/div.

During inside/outside search

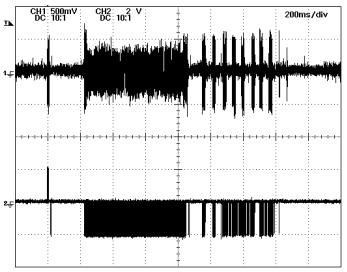
Ref. : VREF
Mode : Normal



⑱ CH1:TEY 500mV/div. 200ms/div.
⑲ CH2:SD 2V/div.

During inside/outside search

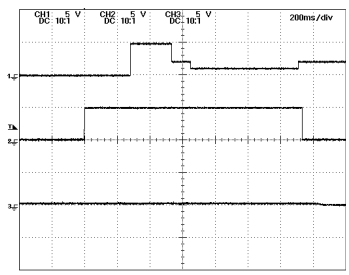
Ref. : VREF
Mode : Normal



① CH1:DSCSNS 5V/div.
② CH2:CLCONT 5V/div. 200ms/div.
③ CH3:LOEJ 5V/div.

When "Eject" (12 cm CD)

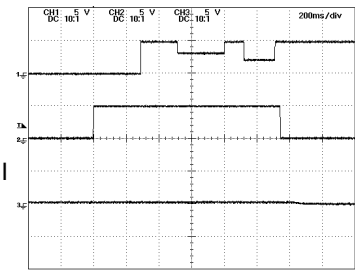
Ref. : GND
Mode : Normal



① CH1:DSCSNS 5V/div.
② CH2:CLCONT 5V/div. 200ms/div.
③ CH3:LOEJ 5V/div.

When "Eject" (8cm CD)

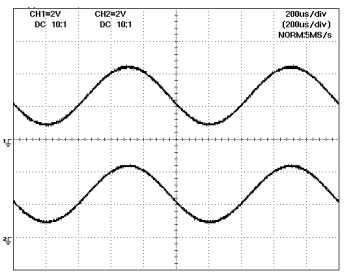
Ref. : GND
Mode : Normal



⑳ CH1:LOUT 2V/div.
㉑ CH2:ROUT 2V/div. 200µs/div.

"Play" in 1kHz, 0dB

Ref. : GND
Mode : Normal



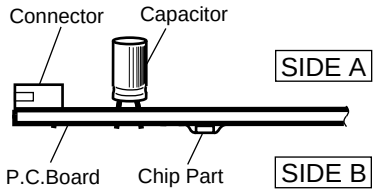
4. PCB CONNECTION DIAGRAM

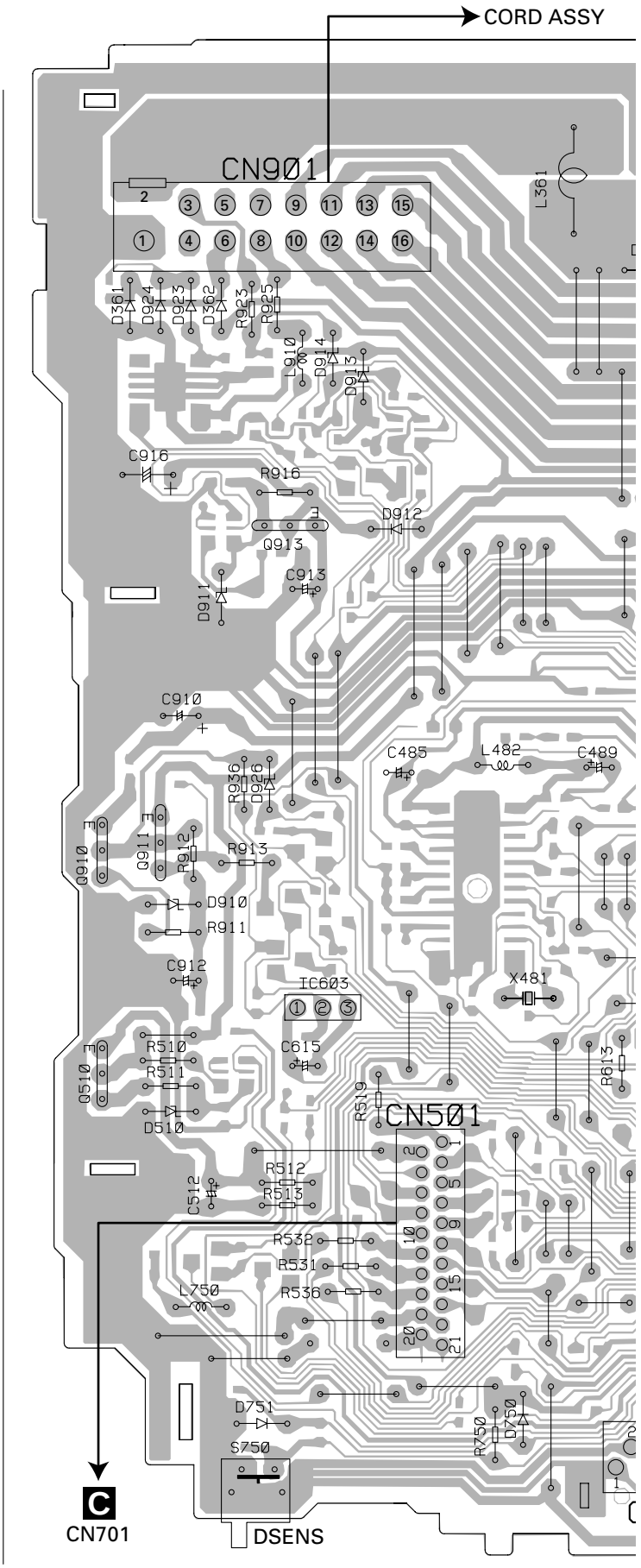
4.1 TUNER AMP UNIT

A TUNER AMP UNIT

NOTE FOR PCB DIAGRAMS

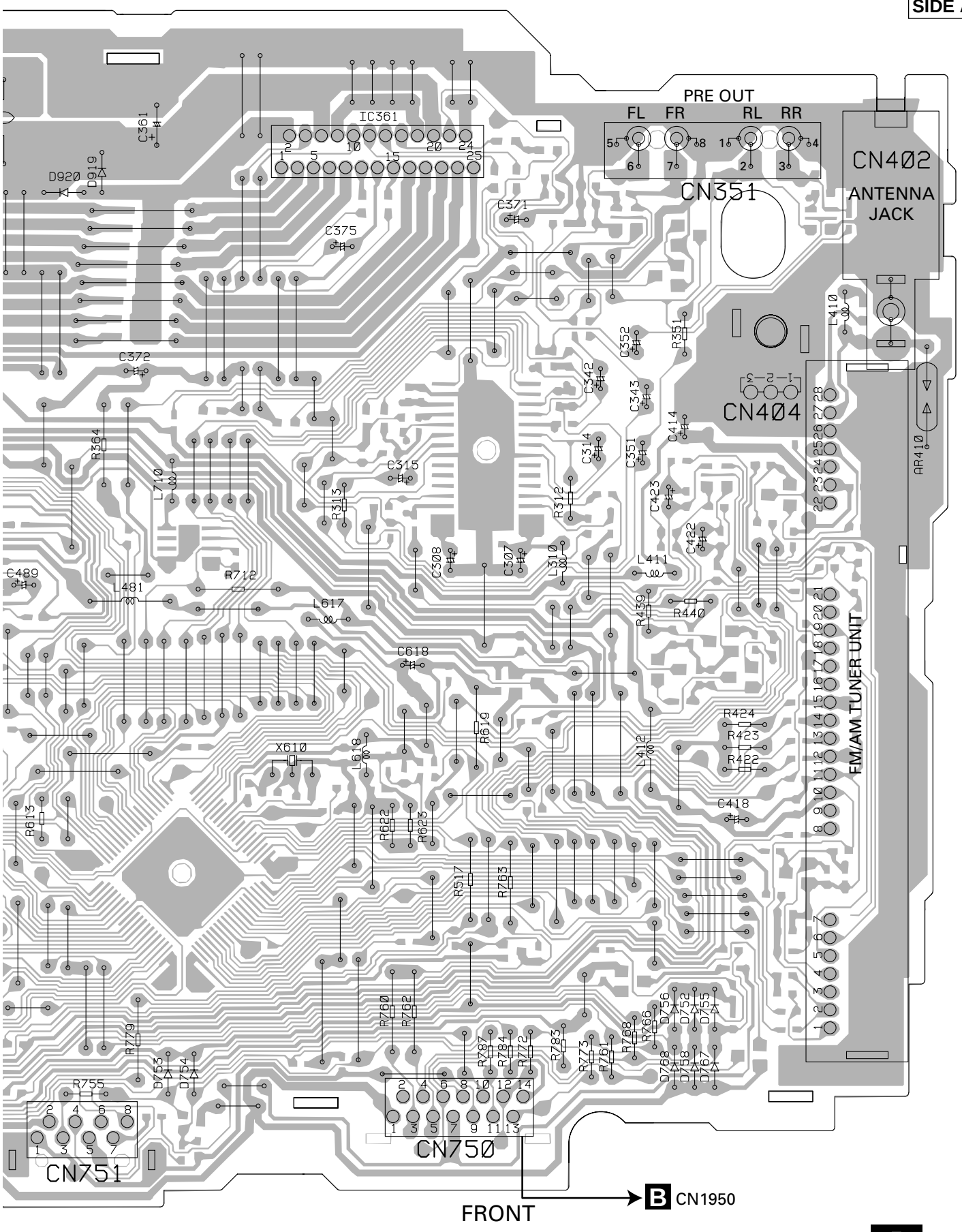
1. The parts mounted on this PCB include all necessary parts for several destination.
   For further information for respective destinations, be sure to check with the schematic diagram.
2. Viewpoint of PCB diagrams



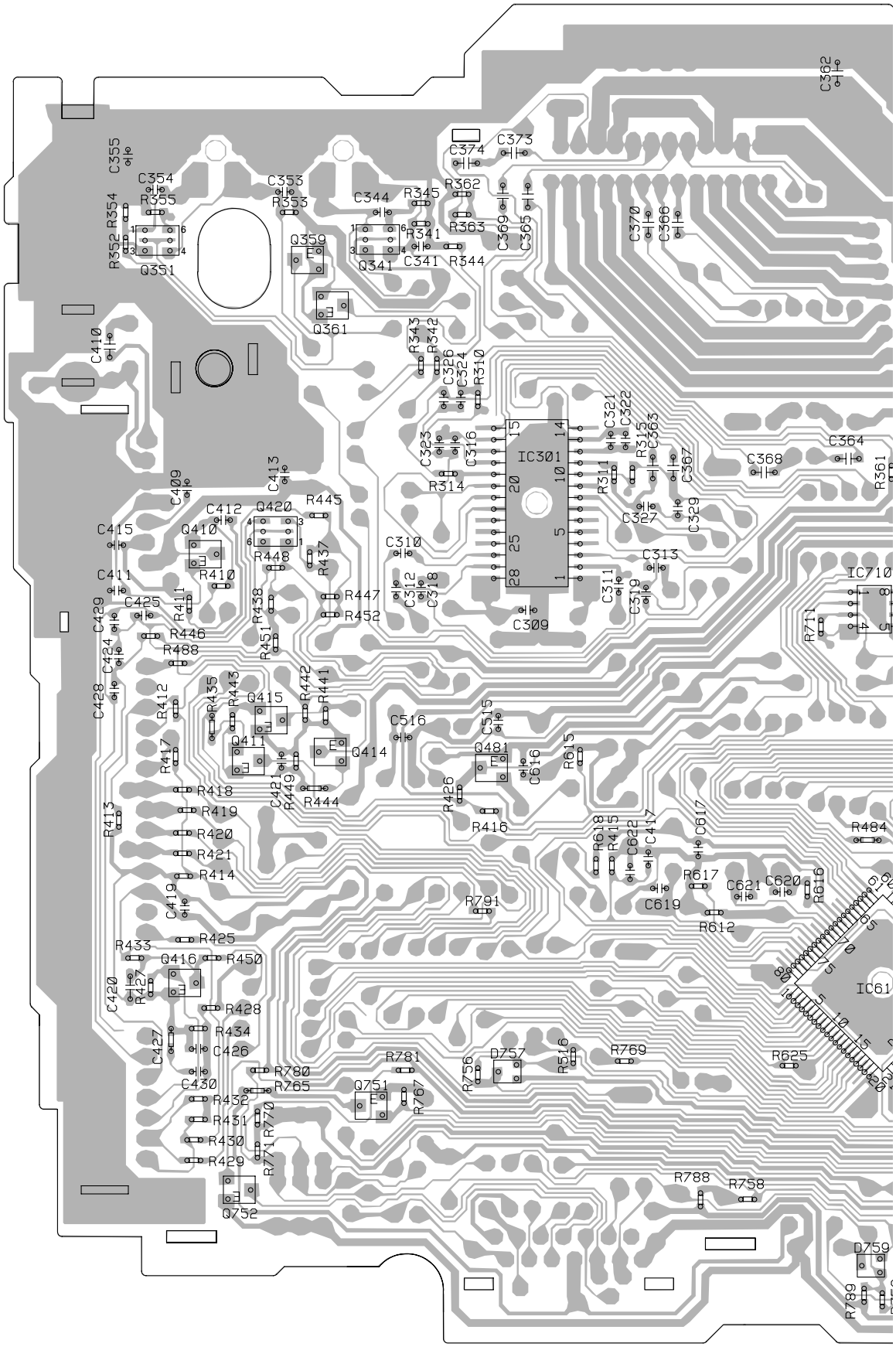


SSY

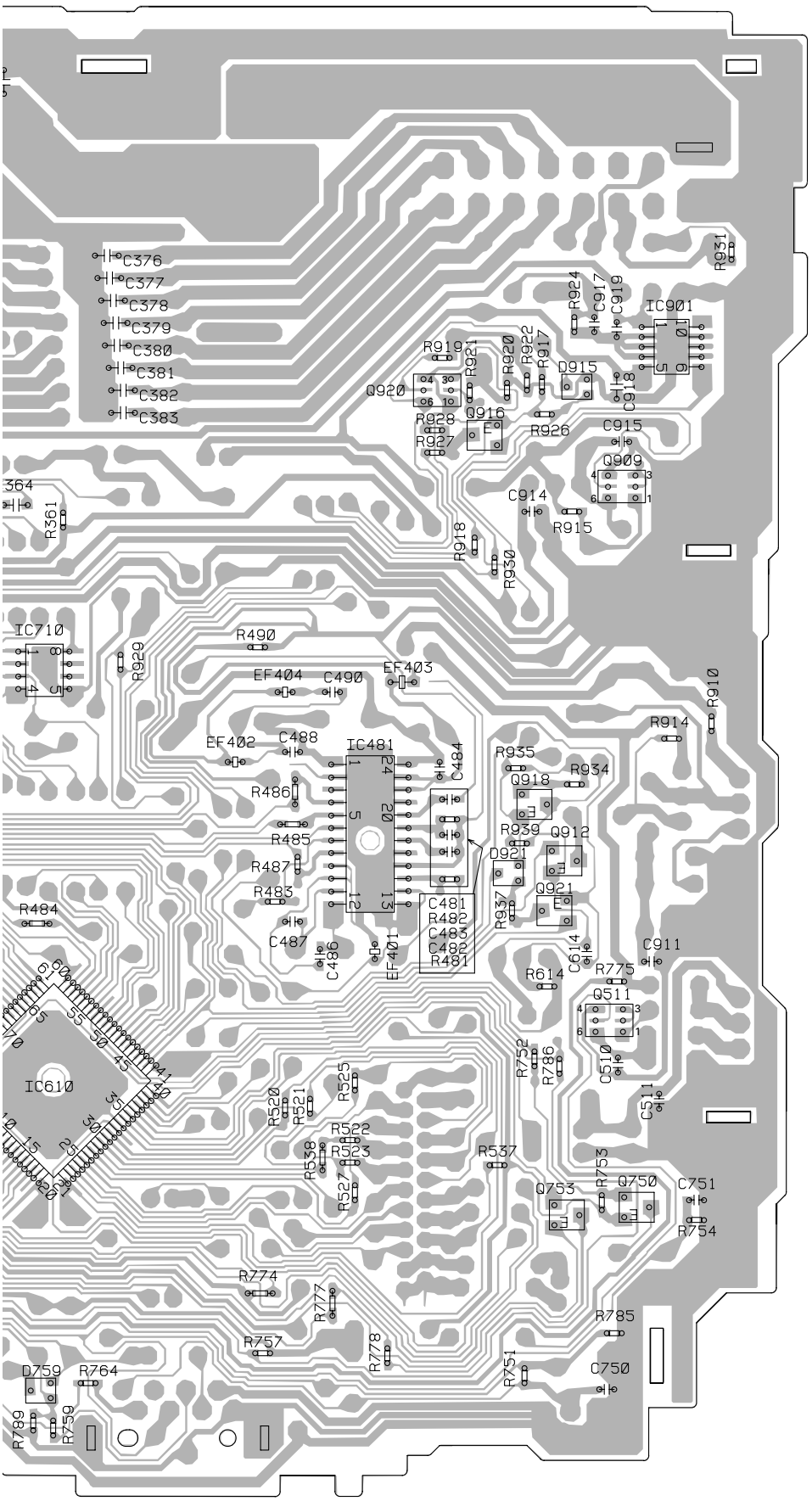
SIDE A


PRE OUT
FL FR RL RR
CN351
CN402
ANTENNA JACK
CN404
IC361
C361
D920
D919
C371
C375
C372
L410
R351
C352
C342
C343
C414
C314
C351
C315
R364
L710
R313
R312
C423
C422
C308
C307
L310
L411
C489
L481
R712
L617
R439
R440
C618
R619
X610
L618
L412
R424
R423
R422
C418
R613
R622
R623
R517
R783
R760
R762
R779
D753
D754
R755
R787
R784
R772
R773
R761
R768
R766
D756
D752
D755
D768
D758
D767
CN751
CN750
FM/AM TUNER UNIT
B CN1950
FRONT

A TUNER AMP UNIT



SIDE B



IC, Q

A

Q359
Q341
Q351
IC901

Q361
Q920
Q916

Q909

B

IC301

Q420
Q410

IC710

IC481
Q415
Q918
Q411
Q414 Q481
Q912

Q921

C

Q511

Q416

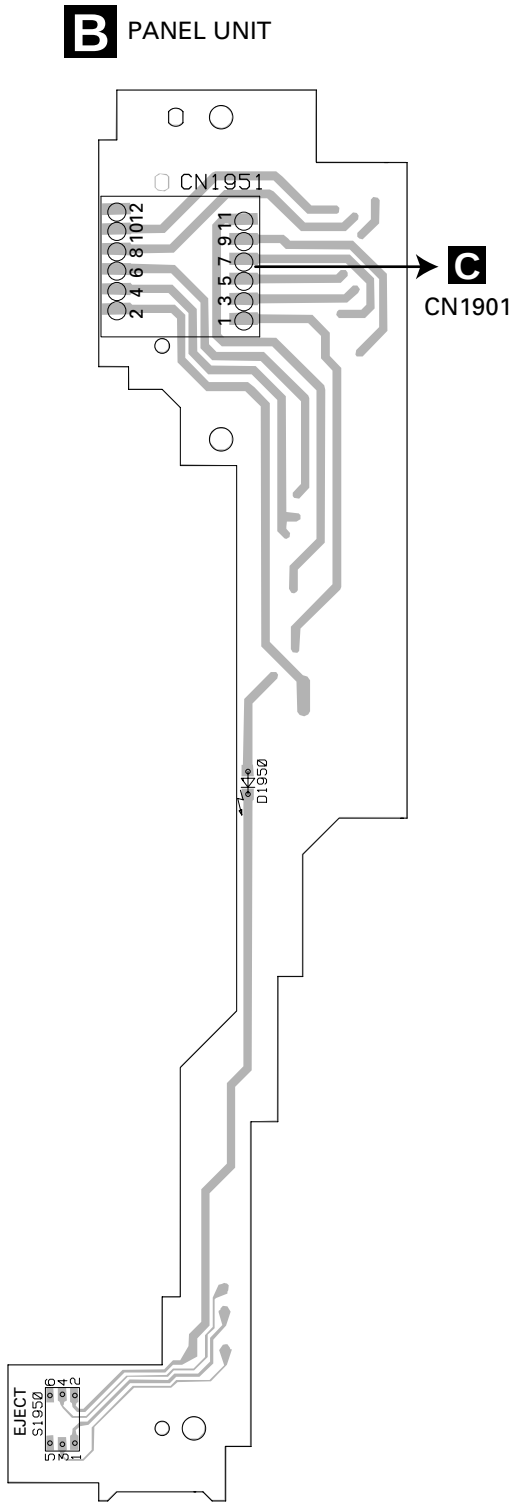
IC610

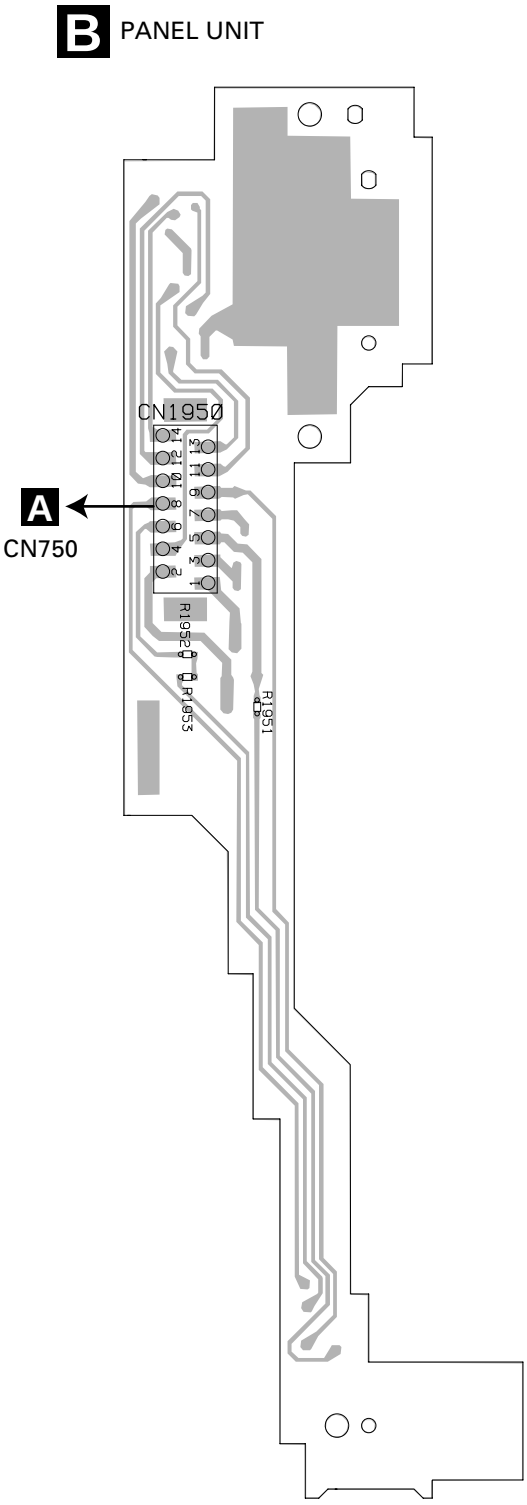
Q750
Q751 Q753

Q752

D

SIDE B

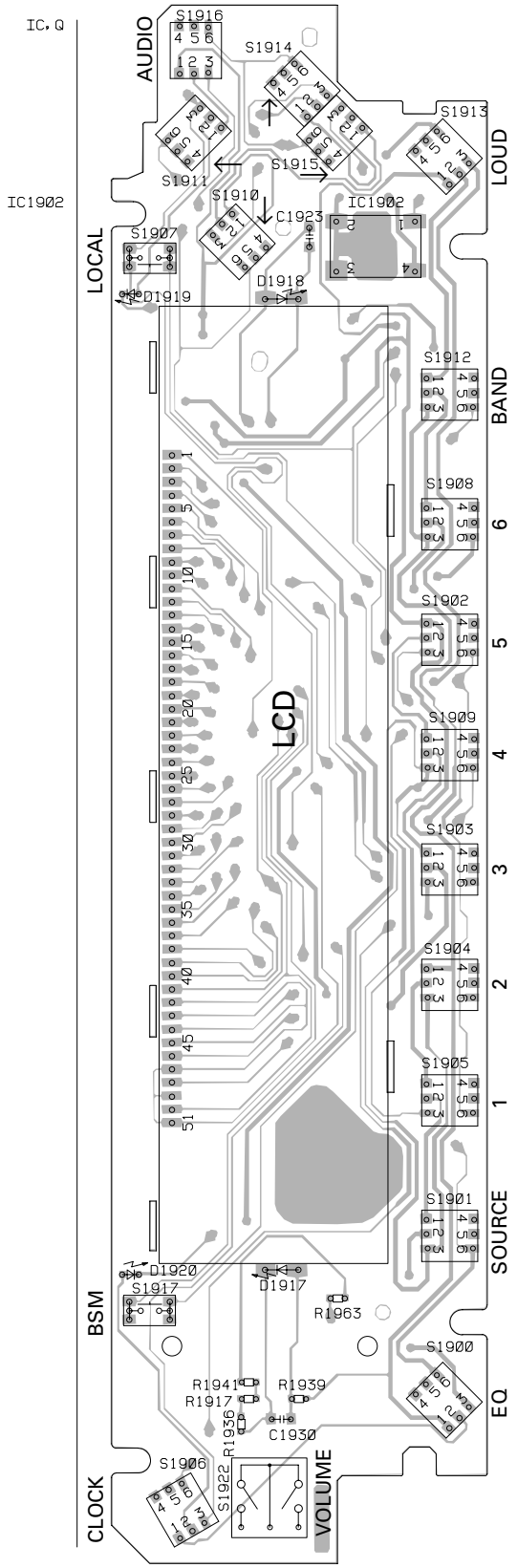

B PANEL UNIT
CN1951
2 4 6 8 10 12
1 3 5 7 9 11
C
CN1901
D1950
EJECT
S1950
5 3 1
6 4 2


B PANEL UNIT
CN1950
A
CN750
R1952
R1953
R1951

4.3 KEYBOARD UNIT

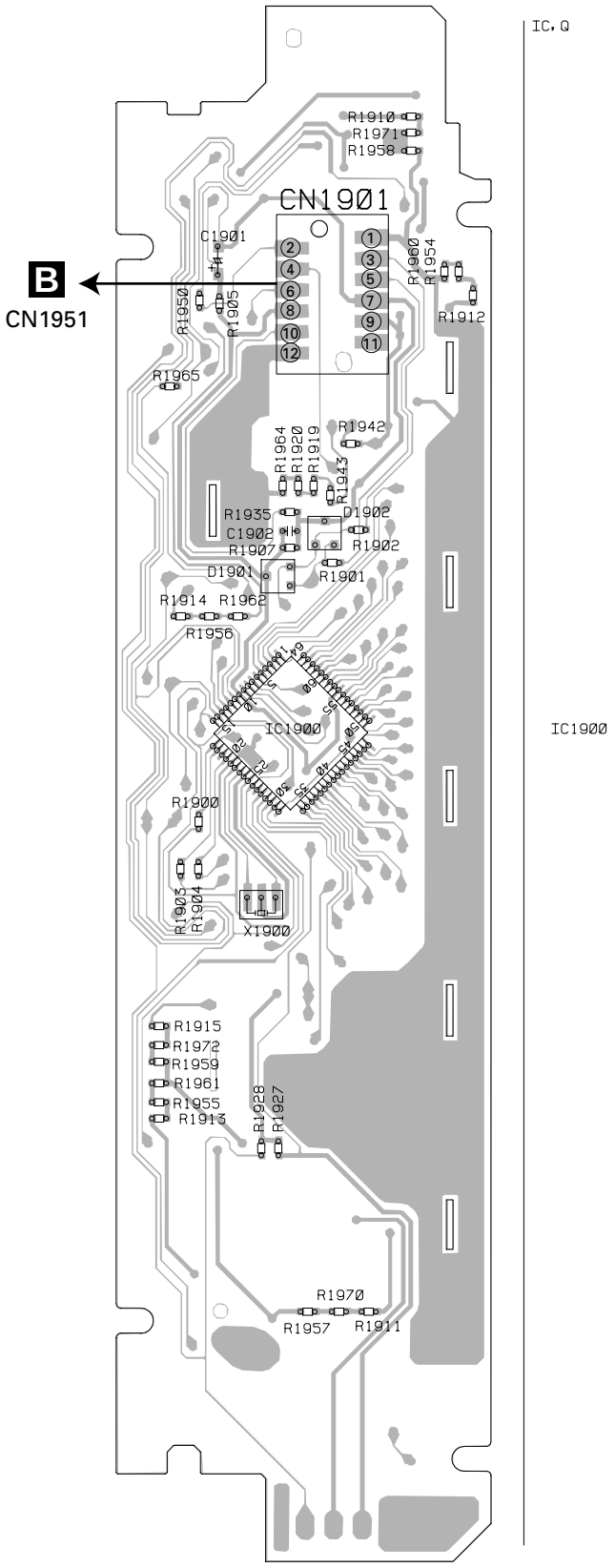
SIDE A

C KEYBOARD UNIT

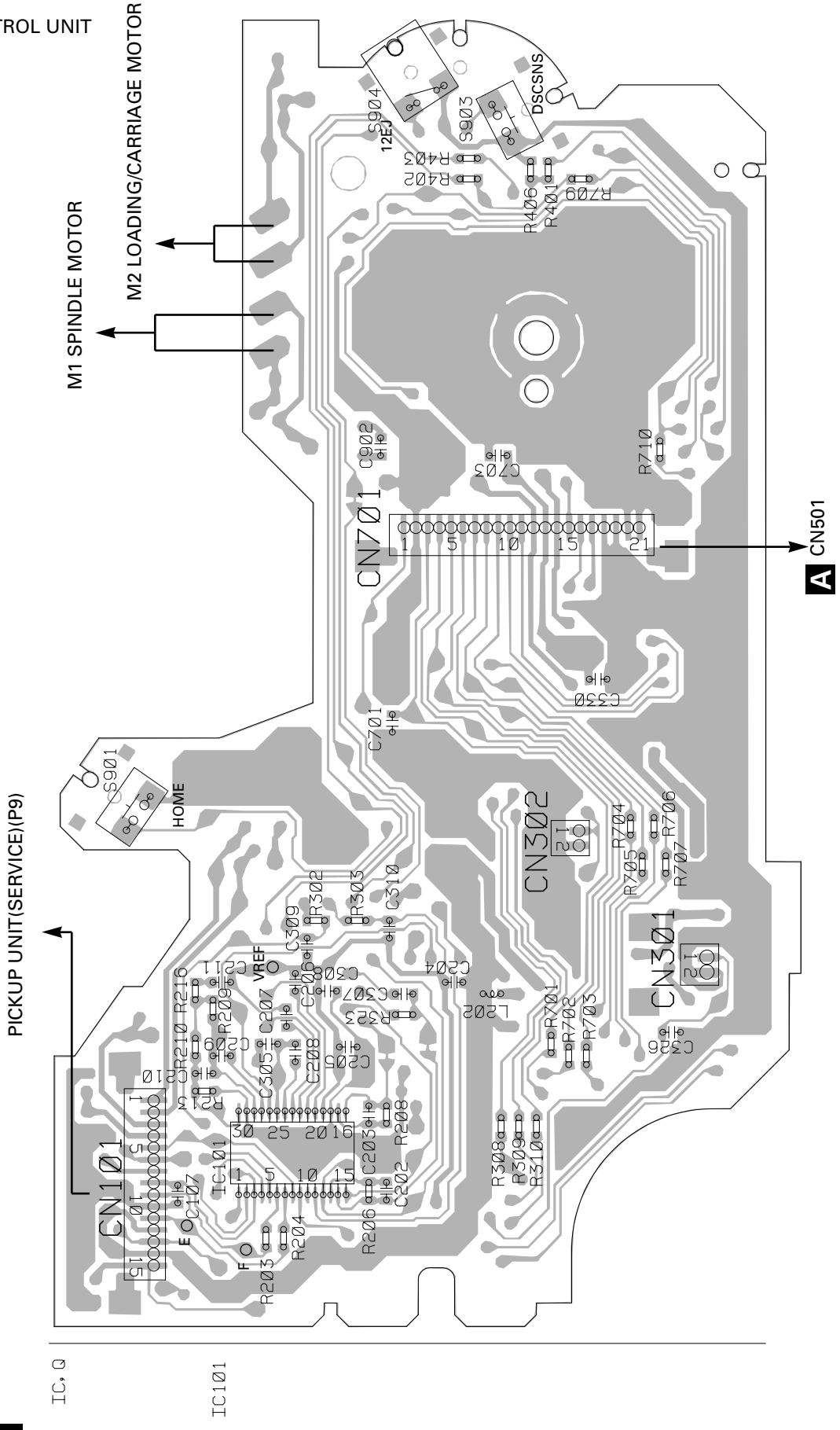


SIDE B

C KEYBOARD UNIT

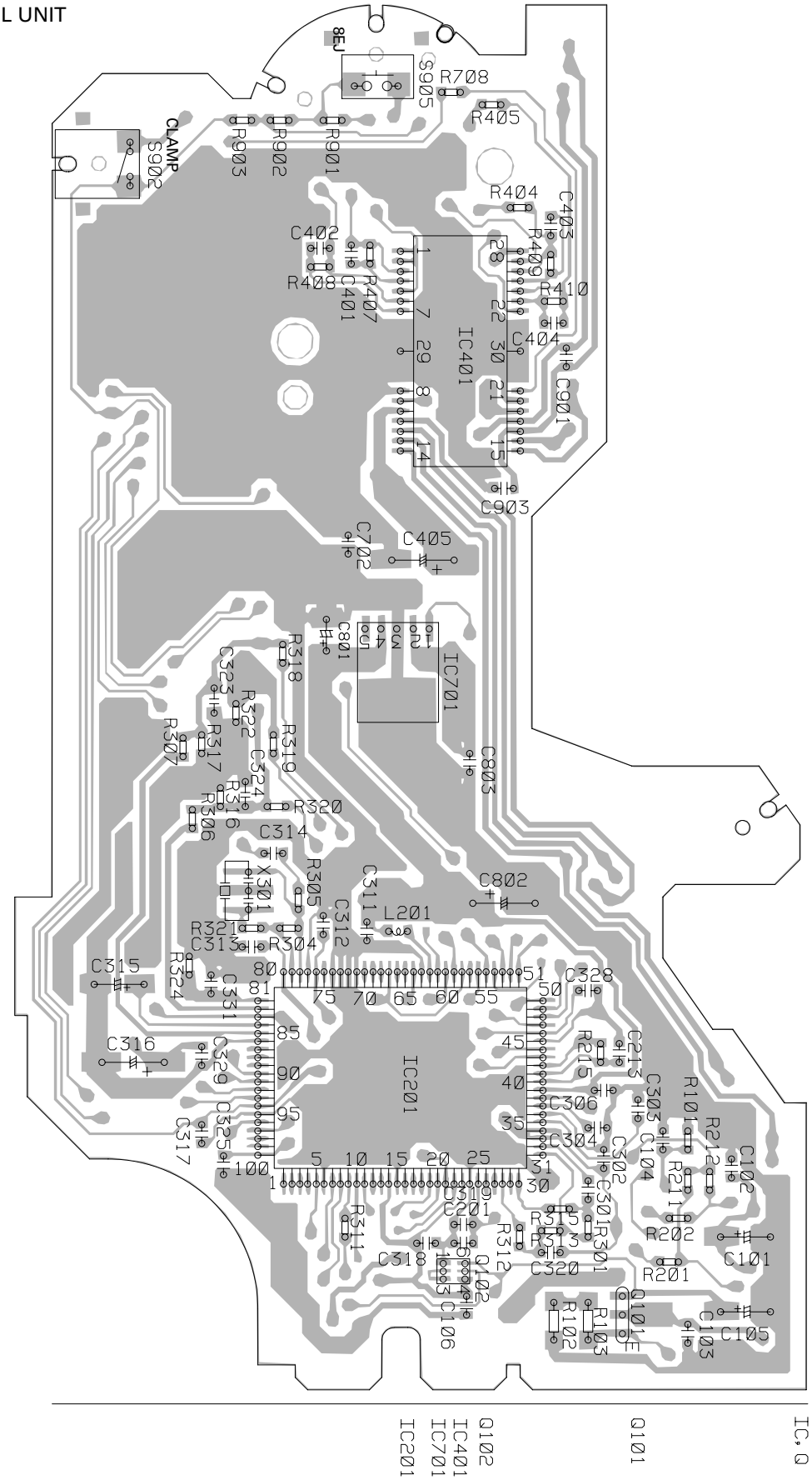


4.4 CD MECHANISM MODULE



D CONTROL UNIT

SIDE B



5. ELECTRICAL PARTS LIST

NOTES:

● Parts whose parts numbers are omitted are subject to being not supplied.

● The part numbers shown below indicate chip components.

Chip Resistor

RS1/○S○○○J,RS1/○○S○○○J

Chip Capacitor (except for CQS.....)

CKS....., CCS....., CSZS.....

A Unit Number : CWM8319
Unit Name : Tuner Amp Unit

MISCELLANEOUS

=====Circuit Symbol and No.		===Part Name	Part No.
IC	301	IC	PML003AM
IC	361	IC	TDA7386
IC	603	IC	S-80834ANY
IC	610	IC	PE5262A
IC	901	IC	TPD1018F
Q	351	Transistor	IMH3A
Q	359	Transistor	DTA124EK
Q	361	Transistor	DTC124EK
Q	410	Transistor	2SC2412K
Q	510	Transistor	2SD2396
Q	511	Transistor	RN46A1
Q	750	Transistor	2SA1037K
Q	751	Transistor	2SA1036K
Q	752	Transistor	DTC114EK
Q	753	Transistor	DTC114EK
Q	909	Transistor	RN46A1
Q	910	Transistor	2SD2396
Q	911	Transistor	2SB1243
Q	912	Transistor	DTC114EK
Q	913	Transistor	2SD1859
Q	920	Transistor	IMX1
Q	921	Transistor	DTA124EK
D	510	Diode	HZS9L(B1)
D	750	Diode	1SS270
D	751	Diode	1SS270
D	752	Diode	1SS270
D	753	Diode	1SS270
D	754	Diode	1SS270
D	755	Diode	1SS270
D	756	Diode	1SS270
D	757	Diode Network	DA204U
D	758	Diode	1SS270
D	759	Diode	MA152WA
D	767	Diode	1SS270
D	768	Diode	1SS270
D	910	Diode	HZS9L(B3)
D	911	Diode	HZS6L(B2)
D	912	Diode	S5688G
D	913	Diode	HZS7L(C2)
D	914	Diode	HZS7L(A1)
D	919	Diode	S5688G
D	920	Diode	S5688G
D	921	Diode	DAN202U
D	923	Diode	S5688G
D	924	Diode	S5688G
L	310	Inductor	LAU1R0K
L	361	Choke Coil 600µH	CTH1221
L	410	Ferri-Inductor	LAU4R7K
L	411	Ferri-Inductor	LAU2R2K
L	412	Ferri-Inductor	LAU2R2K
L	617	Ferri-Inductor	LAU101K
L	618	Ferri-Inductor	LAU2R2K
L	750	Ferri-Inductor	LAU2R2K
X	610	Crystal Resonator 4.194304MHz	CSS1023
S	750	Switch(DSENS)	CSN1039
		FM/AM Tuner Unit	CWE1563
AR	410	Surge Protector	DSP-201M-S00B

RESISTORS

R	310		RS1/16S101J
R	311		RS1/16S101J
R	314		RS1/16S101J
R	315		RS1/16S101J
R	351		RD1/4PU821J
R	352		RS1/16S821J
R	353		RS1/16S223J
R	354		RS1/16S223J
R	355		RS1/16S0R0J
R	361		RS1/16S103J
R	362		RS1/16S103J
R	363		RS1/16S331J
R	364		RD1/4PU153J
R	410		RS1/16S222J
R	411		RS1/16S222J
R	413		RS1/16S473J
R	414		RS1/16S473J
R	415		RS1/16S393J
R	417		RS1/16S681J
R	418		RS1/16S681J
R	419		RS1/16S681J
R	420		RS1/16S103J
R	421		RS1/16S681J
R	422		RD1/4PU473J
R	423		RD1/4PU472J
R	424		RD1/4PU473J
R	429		RS1/16S681J
R	430		RS1/16S681J
R	431		RS1/16S473J
R	432		RS1/16S473J
R	437		RS1/16S0R0J
R	438		RS1/16S0R0J
R	445		RS1/16S272J
R	446		RS1/16S272J
R	447		RS1/16S162J
R	448		RS1/16S162J
R	490		RS1/16S0R0J
R	510		RD1/4PU221J
R	511		RD1/4PU221J
R	512		RD1/4PU472J
R	513		RD1/4PU222J
R	516		RS1/16S104J
R	517		RD1/4PU222J
R	519		RD1/4PU102J
R	520		RS1/16S0R0J

=====Circuit Symbol and No.		===Part Name	Part No.
R	521		RS1/16S0R0J
R	522		RS1/16S0R0J
R	523		RS1/16S0R0J
R	525		RS1/16S0R0J
R	527		RS1/16S0R0J
R	531		RD1/4PU222J
R	532		RD1/4PU222J
R	536		RD1/4PU102J
R	537		RS1/16S104J
R	538		RS1/16S0R0J
R	612		RS1/16S0R0J
R	613		RD1/4PU102J
R	614		RS1/16S821J
R	615		RS1/16S473J
R	616		RS1/16S682J
R	617		RS1/16S473J
R	618		RS1/16S223J
R	622		RD1/4PU393J
R	623		RD1/4PU104J
R	625		RS1/16S0R0J
R	712		RD1/4PU104J
R	750		RD1/4PU104J
R	751		RS1/16S103J
R	752		RS1/16S153J
R	753		RS1/16S153J
R	754		RS1/16S222J
R	756		RS1/16S473J
R	757		RS1/16S104J
R	758		RS1/16S102J
R	760		RD1/4PU222J
R	761		RD1/4PU472J
R	762		RD1/4PU222J
R	763		RD1/4PU222J
R	765		RS1/16S1R0J
R	766		RD1/4PU102J
R	767		RS1/16S103J
R	768		RD1/4PU102J
R	769		RS1/16S102J
R	771		RS1/16S104J
R	772		RD1/4PU222J
R	773		RD1/4PU222J
R	774		RS1/16S0R0J
R	775		RS1/16S1R0J
R	777		RS1/16S152J
R	778		RS1/16S152J
R	779		RD1/4PU103J
R	781		RS1/16S104J
R	783		RD1/4PU391J
R	784		RD1/4PU222J
R	786		RS1/16S102J
R	787		RD1/4PU222J
R	791		RS1/16S0R0J
R	910		RS1/16S1R0J
R	911		RD1/4PU220J
R	912		RD1/4PU132J
R	913		RD1/4PU122J
R	914		RS1/16S103J
R	915		RS1/16S222J
R	916		RD1/4PU153J
R	917		RS1/16S104J
R	918		RS1/16S104J
R	919		RS1/16S104J
R	920		RS1/16S473J
R	921		RS1/16S103J
R	922		RS1/16S473J
R	923		RD1/4PU102J
R	924		RS1/16S472J
R	927		RS1/16S102J
R	928		RS1/16S473J
R	929		RS1/16S0R0J
R	930		RS1/16S0R0J
R	931		RS1/16S0R0J
R	937		RS1/16S152J
R	939		RS1/16S0R0J

CAPACITORS

=====Circuit Symbol and No.		===Part Name	Part No.
C	307		CEJQ470M10
C	308		CEJQ100M16
C	309		CKSRYB104K25
C	310		CKSRYB105K6R3
C	311		CKSRYB104K25
C	312		CKSRYB104K25
C	313		CKSRYB105K6R3
C	314		CEJQ4R7M35
C	315		CEJQ4R7M35
C	316		CKSRYB153K25
C	321		CKSRYB153K25
C	324		CCSRCH100D50
C	326		CCSRCH100D50
C	327		CCSRCH100D50
C	329		CCSRCH100D50
C	351		CEJQ2R2M50
C	352		CEJQ2R2M50
C	361	3300µF/16V	CCH1368
C	362		CKSRYB104K25
C	363		CKSQYB474K16
C	364		CKSQYB474K16
C	365		CKSQYB474K16
C	366		CKSQYB474K16
C	367		CKSQYB474K16
C	368		CKSQYB474K16
C	369		CKSQYB474K16
C	370		CKSQYB474K16
C	371		CEJQ330M10
C	372		CEJQ2R2M50
C	373		CKSQYB225K10
C	374		CKSQYB225K10
C	375		CEJQ100M16
C	410		CKSQYB103K25
C	412		CKSRYB223K50
C	413		CKSRYB102K50
C	414		CEJQ220M10
C	415		CKSRYB223K50
C	417		CKSRYB472K50
C	418		CEJQ101M6R3
C	419		CKSRYB473K50
C	424		CKSRYB183K25
C	425		CKSRYB183K25
C	510		CKSRYB473K50
C	511		CKSRYB102K50
C	512		CEJQ101M10
C	515		CKSRYB102K50
C	516		CKSRYB102K50
C	614		CKSRYB473K50
C	615		CEJQ2R2M50
C	616		CKSRYB104K25
C	617		CCSRCH101J50
C	618		CEJQ4R7M35
C	619		CKSRYB473K50
C	620		CCSRCH150J50
C	621		CCSRCH150J50

Circuit Symbol and No.		Part Name	Part No.
C	750		CKSRYB103K50
C	751		CKSRYB104K25
C	910	330µF/16V	CCH1326
C	911		CKSRYB103K50
C	912		CEJQ101M16
C	913		CEJQ101M10
C	914		CKSRYB473K50
C	915		CKSRYB103K50
C	916	470µF/16V	CCH1331
C	918		CKSQYB473K50
C	919		CKSRYB103K50

C Unit Number : CWM8370(DEH-240F/XN/UC, DEH-2400F/XN/UC)
Unit Name : Keyboard Unit

MISCELLANEOUS

IC	1900	IC	PD6340A
D	1901	Diode	MA152WK
D	1902	Diode	MA152WA
D	1917	LED	NSSW440-9159
D	1918	LED	NSSW440-9159
D	1919	LED	SML-310PT
D	1920	LED	SML-310PT
X	1900	Ceramic Resonator 4.97MHz	CSS1573
S	1900	Switch	CSG1107
S	1901	Switch	CSG1107
S	1902	Switch	CSG1107
S	1903	Switch	CSG1107
S	1904	Switch	CSG1107
S	1905	Switch	CSG1107
S	1906	Switch	CSG1107
S	1907	Push Switch	CSG1111
S	1908	Switch	CSG1107
S	1909	Switch	CSG1107
S	1910	Switch	CSG1107
S	1911	Switch	CSG1107
S	1912	Switch	CSG1107
S	1913	Switch	CSG1107
S	1914	Switch	CSG1107
S	1915	Switch	CSG1107
S	1916	Switch	CSG1107
S	1917	Push Switch	CSG1111
S	1922	Switch(VOLUME)	CSD1077
		LCD	CAW1724

RESISTORS

R	1900		RS1/16S473J
R	1901		RS1/16S222J
R	1902		RS1/16S222J
R	1903		RS1/16S470J
R	1904		RS1/16S470J
R	1910		RS1/16S151J
R	1911		RS1/16S181J
R	1912		RS1/16S151J
R	1913		RS1/16S181J
R	1914		RS1/16S181J
R	1915		RS1/16S181J
R	1917		RS1/16S121J
R	1919		RS1/16S121J
R	1920		RS1/16S121J
R	1927		RS1/16S472J
R	1935		RS1/16S104J
R	1936		RS1/16S151J
R	1939		RS1/16S151J
R	1941		RS1/16S121J
R	1942		RS1/16S151J
R	1943		RS1/16S151J
R	1950		RS1/16S104J
R	1954		RS1/16S151J
R	1955		RS1/16S181J
R	1956		RS1/16S181J
R	1957		RS1/16S181J
R	1958		RS1/16S151J
R	1959		RS1/16S181J
R	1960		RS1/16S151J
R	1961		RS1/16S181J
R	1962		RS1/16S181J
R	1963		RS1/16S121J
R	1964		RS1/16S121J
R	1970		RS1/16S181J
R	1971		RS1/16S151J
R	1972		RS1/16S181J

CAPACITORS

C	1902	CKSRYB104K25
C	1923	CKSQYF104Z50
C	1930	CKSQYF104Z50

C Unit Number : CWM8322(DEH-24F/XN/UC)
Unit Name : Keyboard Unit

MISCELLANEOUS

IC	1900	IC	PD6340A
D	1901	Diode	MA152WK
D	1902	Diode	MA152WA
D	1917	LED	NSSW440-9159
D	1918	LED	NSSW440-9159
D	1919	LED	SML-310DT
D	1920	LED	SML-310DT
X	1900	Ceramic Resonator 4.97MHz	CSS1573
S	1900	Push Switch	CSG1133
S	1901	Push Switch	CSG1117
S	1902	Push Switch	CSG1117
S	1903	Push Switch	CSG1117
S	1904	Push Switch	CSG1117
S	1905	Push Switch	CSG1117
S	1906	Push Switch	CSG1117
S	1907	Push Switch	CSG1111
S	1908	Push Switch	CSG1117
S	1909	Push Switch	CSG1117
S	1910	Push Switch	CSG1117
S	1911	Push Switch	CSG1117
S	1912	Push Switch	CSG1117
S	1913	Push Switch	CSG1117
S	1914	Push Switch	CSG1117
S	1915	Push Switch	CSG1117
S	1916	Push Switch	CSG1117
S	1917	Push Switch	CSG1111
S	1922	Switch(VOLUME)	CSD1077
		LCD	CAW1719

RESISTORS

R	1900		RS1/16S473J
R	1901		RS1/16S222J
R	1902		RS1/16S222J
R	1903		RS1/16S470J
R	1904		RS1/16S470J
R	1910		RS1/16S151J
R	1911		RS1/16S181J
R	1912		RS1/16S151J
R	1913		RS1/16S181J
R	1914		RS1/16S181J

Circuit Symbol and No.	Part Name	Part No.
R 1915		RS1/16S181J
R 1917		RS1/16S121J
R 1919		RS1/16S121J
R 1920		RS1/16S121J
R 1927		RS1/16S472J
R 1935		RS1/16S104J
R 1936		RS1/16S151J
R 1939		RS1/16S151J
R 1941		RS1/16S121J
R 1942		RS1/16S151J
R 1943		RS1/16S151J
R 1950		RS1/16S104J
R 1954		RS1/16S151J
R 1955		RS1/16S181J
R 1956		RS1/16S181J
R 1957		RS1/16S181J
R 1958		RS1/16S151J
R 1959		RS1/16S181J
R 1960		RS1/16S151J
R 1961		RS1/16S181J
R 1962		RS1/16S181J
R 1963		RS1/16S121J
R 1964		RS1/16S121J
R 1970		RS1/16S181J
R 1971		RS1/16S151J
R 1972		RS1/16S181J

CAPACITORS

C 1902		CKSRYB104K25
C 1923		CKSQYF104Z50
C 1930		CKSQYF104Z50

B Unit Number : CWM7375
Unit Name : Panel Unit

D 1950	LED	CL220PGC
S 1950	Push Switch(EJECT)	CSG1112
R 1952		RS1/16S101J
R 1953		RS1/16S101J

D Unit Number : CWX2481
Unit Name : Control Unit

MISCELLANEOUS

IC 101	IC	TA2153FN
IC 201	IC	TC9495F2
IC 401	IC	BA5996FM
IC 701	IC	BA05SFP
Q 101	Transistor	2SD1664
Q 102	Transistor	UMD2N
L 201	Inductor	CTF1546
L 202	Inductor	CTF1546
X 301	Ceramic Resonator 16.934MHz	CSS1525
S 901	Spring Switch(HOME)	CSN1051
S 902	Spring Switch(CLAMP)	CSN1052
S 903	Spring Switch(DSCSNS)	CSN1051
S 904	Spring Switch(12EJ)	CSN1052
S 905	Spring Switch(8EJ)	CSN1051

RESISTORS

R 101	RS1/16S222J
R 102	RS1/8S120J
R 103	RS1/8S100J
R 201	RS1/16S513J
R 202	RS1/16S513J
R 203	RS1/16S823J
R 204	RS1/16S823J
R 206	RS1/16S823J
R 208	RS1/16S124J
R 209	RS1/16S183J
R 210	RS1/16S153J
R 211	RS1/16S103J
R 212	RS1/16S103J
R 213	RS1/16S124J
R 215	RS1/16S0R0J
R 216	RS1/16S471J
R 301	RS1/16S333J
R 302	RS1/16S332J
R 303	RS1/16S332J
R 304	RS1/16S514J
R 306	RS1/16S102J
R 307	RS1/16S102J
R 312	RS1/16S103J
R 313	RS1/16S473J
R 315	RS1/16S334J
R 321	RS1/16S331J
R 322	RS1/16S0R0J
R 323	RS1/16S332J
R 401	RS1/16S684J
R 402	RS1/16S103J
R 403	RS1/16S103J
R 404	RS1/16S183J
R 405	RS1/16S123J
R 407	RS1/16S622J
R 408	RS1/16S622J
R 409	RS1/16S113J
R 410	RS1/16S752J
R 701	RS1/16S102J
R 702	RS1/16S221J
R 703	RS1/16S221J
R 704	RS1/16S221J
R 705	RS1/16S221J
R 706	RS1/16S221J
R 707	RS1/16S221J
R 708	RS1/16S102J
R 709	RS1/16S102J
R 710	RS1/16S102J
R 901	RS1/16S104J
R 902	RS1/16S473J
R 903	RS1/16S273J

CAPACITORS

C 101	CEV470M6R3
C 102	CKSRYB102K50
C 103	CKSRYB104K16
C 104	CKSRYB224K16
C 105	CEV470M6R3
C 106	CKSRYB104K16
C 107	CKSRYB105K6R3
C 201	CKSRYB104K16
C 202	CCSRCH560J50
C 204	CKSRYB224K16
C 205	CKSRYB224K16
C 206	CKSRYB273K25
C 207	CKSRYB273K25
C 208	CKSRYB104K16
C 209	CKSRYB104K16
C 210	CCSRCK2R0C50
C 211	CCSRCH220J50
C 301	CKSRYB153K25
C 302	CKSRYB104K16
C 303	CKSRYB103K50

=====Circuit Symbol and No.		===Part Name	Part No.
C	304		CKSRYB103K50
C	305		CKSRYB104K16
C	306		CKSRYB104K16
C	307		CKSRYB333K16
C	308		CKSRYB104K16
C	309		CKSRYB473K16
C	310		CKSRYB473K16
C	311		CKSRYB104K16
C	312		CKSRYB104K16
C	315		CEV220M6R3
C	317		CKSRYB104K16
C	318		CKSRYB104K16
C	319		CKSRYB104K16
C	320		CCSRCH470J50
C	325		CKSRYB471K50
C	328		CKSRYB472K50
C	329		CKSRYB104K16
C	330		CKSRYB104K16
C	331		CKSRYB104K16
C	401		CKSRYB221K50
C	402		CKSRYB221K50
C	403		CKSRYB153K25
C	404		CKSRYB103K50
C	405		CEV101M10
C	702		CKSRYB104K16
C	703		CKSRYB104K16
C	801	10µF/10V	CCH1349
C	802		CEV101M10
C	803		CKSRYB224K16

Miscellaneous Parts List

		Pickup Unit(Service)(P9)	CXX1480
M	1	Motor Unit(SPINDLE)	CXB6007
M	2	Motor Unit(LOADING/CARRIAGE)	CXB5903

6. ADJUSTMENT

6.1 CD ADJUSTMENT

1) Precautions

- This unit uses a single power supply (+5V) for the regulator. The signal reference potential, therefore, is connected to VREF(approx. 2.1V) instead of GND.
  If VREF and GND are connected to each other by mistake during adjustments, not only will it be impossible to measure the potential correctly, but the servo will malfunction and a severe shock will be applied to the pick-up. To avoid this, take special note of the following.
  Do not connect the negative probe of the measuring equipment to VREF and GND together. It is especially important not to connect the channel 1 negative probe of the oscilloscope to VREF with the channel 2 negative probe connected to GND.
  Since the frame of the measuring instrument is usually at the same potential as the negative probe, change the frame of the measuring instrument to floating status.
  If by accident VREF comes in contact with GND, immediately switch the regulator or power OFF.

- Always make sure the regulator is OFF when connecting and disconnecting the various filters and wiring required for measurements.

- Before proceeding to further adjustments and measurements after switching regulator ON, let the player run for about one minute to allow the circuits to stabilize.

- Since the protective systems in the unit's software are rendered inoperative in test mode, be very careful to avoid mechanical and /or electrical shocks to the system when making adjustment.

- The RFI and RFO signals are easy to oscillate because of a wide band. When observing them, insert a resistor of about 1 kΩ to the series.

- This equipment will not guarantee the load ejection operation when the mechanical unit is turned upside down. In particular, if the ejection operation is incorrectly performed and recovery is disabled, the recovery is enabled by resetting a product or turning ACC off to on.

2) Test Mode

This mode is used for adjusting the CD mechanism module of the device.

- Test mode starting procedure
  Reset while pressing the **4** and **6** keys together.

- Test mode cancellation
  Switch ACC, back-up OFF.

- After pressing the EJECT key, do not press any other key until the disk is completely ejected.

- If the ► or ◄ key is pressed while focus search is in progress, immediately turn the power off (otherwise the actuator may be damaged due to adhesion of the lenses).

6.2 CHECKING THE GRATING AFTER CHANGING THE PICKUP UNIT

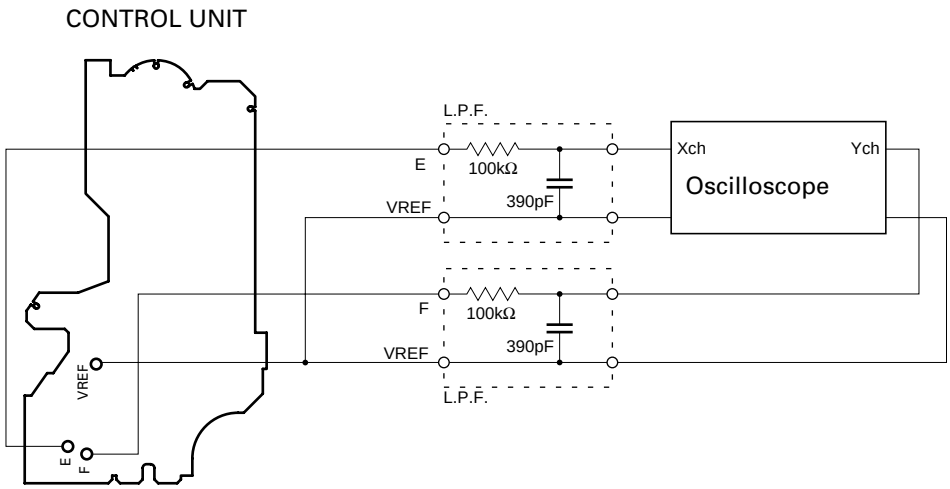
• **Note :**
The grating angle of the PU unit cannot be adjusted after the PU unit is changed. The PU unit in the CD mechanism module is adjusted on the production line to match the CD mechanism module and is thus the best adjusted PU unit for the CD mechanism module. Changing the PU unit is thus best considered as a last resort. However, if the PU unit must be changed, the grating should be checked using the procedure below.

• **Purpose :**
To check that the grating is within an acceptable range when the PU unit is changed.

• **Symptoms of Mal-adjustment :**
If the grating is off by a large amount symptoms such as being unable to close tracking, being unable to perform track search operations, or taking a long time for track searching.

• **Method :**

• Measuring Equipment	• Oscilloscope, Two L.P.F.
• Measuring Points	• E, F, VREF
• Disc	• ABEX TCD-784
• Mode	• TEST MODE



• **Checking Procedure**
1. In test mode, load the disc and switch the 5V regulator on.
2. The display will change, returning to "81" on the fourth press.
3. As shown in the diagram above, monitor the LPF outputs using the oscilloscope and check that the phase difference is within 75° . Refer to the photographs supplied to determine the phase angle.
4. If the phase difference is determined to be greater than 75° try changing the PU unit to see if there is any improvement. If, after trying this a number of times, the grating angle does not become less than 75° then the mechanism should be judged to be at fault.

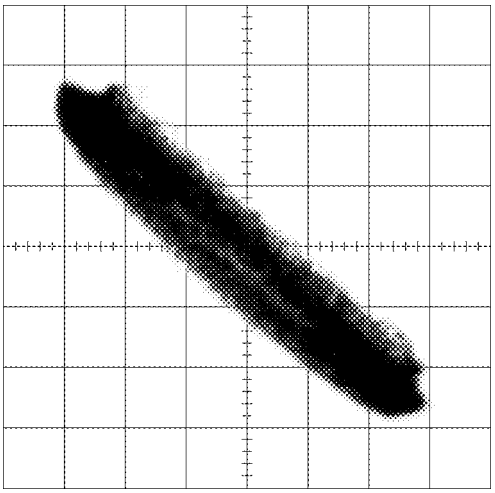
• **Note**
Because of eccentricity in the disc and a slight misalignment of the clamping center the grating waveform may be seen to "wobble" (the phase difference changes as the disc rotates). The angle specified above indicates the average angle.

• **Hint**
Reloading the disc changes the clamp position and may decrease the "wobble".

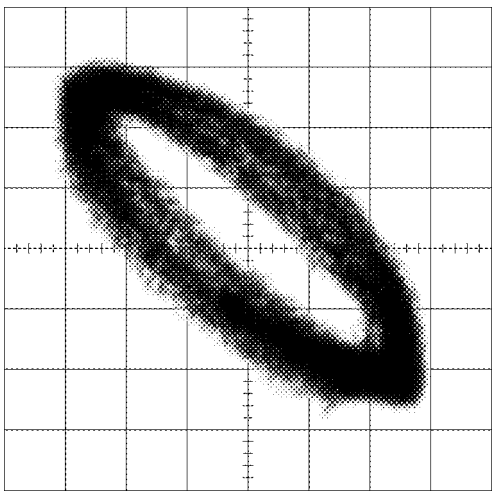
Grating waveform

Ech → Xch 20mV/div, AC
Fch → Ych 20mV/div, AC

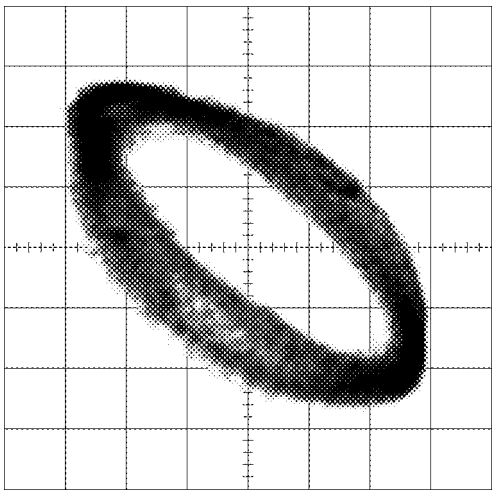
0°



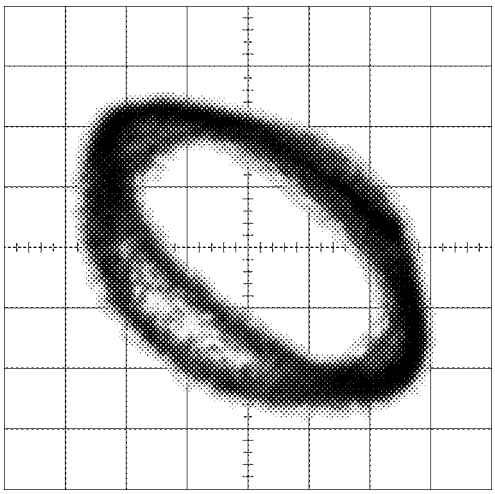
30°



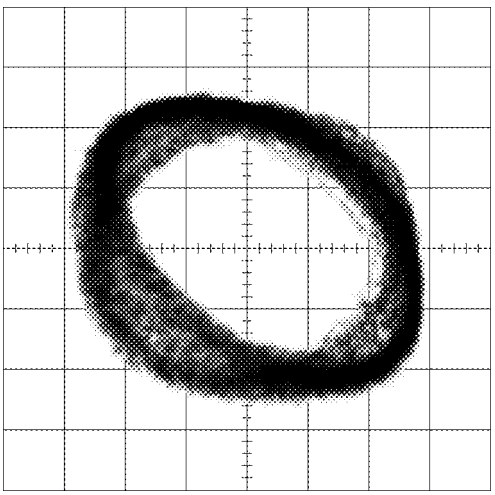
45°



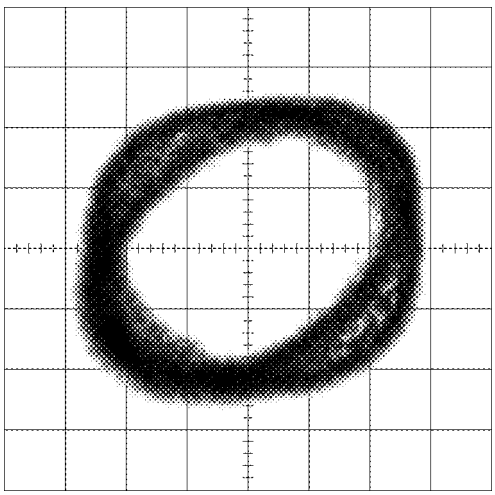
60°



75°



90°



6.3 ERROR MODE

● Error Messages

If a CD is not operative or stopped during operation due to an error, the error mode is turned on and cause(s) of the error is indicated with a corresponding number. This arrangement is intended at reducing nonsense calls from the users and also for facilitating trouble analysis and repair work in servicing.

(1) Basic Indication Method

1) When SERRORM is selected for the CSMOD (CD mode area for the system), error codes are written to DMIN (minutes display area) and DSEC (seconds display area). The same data is written to DMIN and DSEC. DTNO remains in blank as before.

2) Head unit display examples

Depending on display capability of LCD used, display will vary as shown below. xx contains the error number.

8-digit display	6-digit display	4-digit display
ERROR–xx	ERR–xx	E–xx

(2) Error Code List

Code	Class	Displayed error code	Description of the code and potential cause(s)
10	Electricity	Carriage Home NG SERVO LSI Communication Error	CRG can't be moved to inner diameter. CRG can't be moved from inner diameter. → Failure on home switch or CRG move mechanism. Communication error between microcomputer and SERVO LSI.
11	Electricity	Focus Servo NG	Focusing not available. → Stains on rear side of disc or excessive vibrations on REWRITABLE.
12	Electricity	Spindle Lock NG Subcode NG	Spindle not locked. Sub-code is strange (not readable). → Failure on spindle, stains or damages on disc, or excessive vibrations. A disc not containing CD-R data is found. Turned over disc are found, though rarely. CD signal error.
17	Electricity	Setup NG	AGC protection doesn't work. Focus can be easily lost. → Damages or stains on disc, or excessive vibrations on REWRITABLE.
30	Electricity	Search Time Out	Failed to reach target address. → CRG tracking error or damages on disc.
44	Electricity	ALL Skip	Skip setting for all track. (CD-R/RW)
50	Mechanism	CD On Mech Error	Mechanical error during CD ON. → Defective loading motor, mechanical lock and mechanical sensor.
A0	System	Power Supply NG	Power (VD) is ground faulted. → Failure on SW transistor or power supply (failure on connector).

Remarks: Mechanical errors are not displayed (because a CD is turned off in these errors).

Unreadable TOC does not constitute an error. An intended operation continues in this case.

Upper digits of an error code are subdivided as shown below:

1x: Setup relevant errors, 3x: Search relevant errors, Ax: Other errors.

7. GENERAL INFORMATION

7.1 DIAGNOSIS

7.1.1 DISASSEMBLY

● **Removing the Case (not shown)**

1. Remove the Case.

● **Removing the Panel Assy (Fig.1)**

1 Remove the two screws and then remove the Panel Assy.

● **Removing the CD Mechanism Module (Fig.1)**

2 Remove the four screws and then remove the CD Mechanism Module.

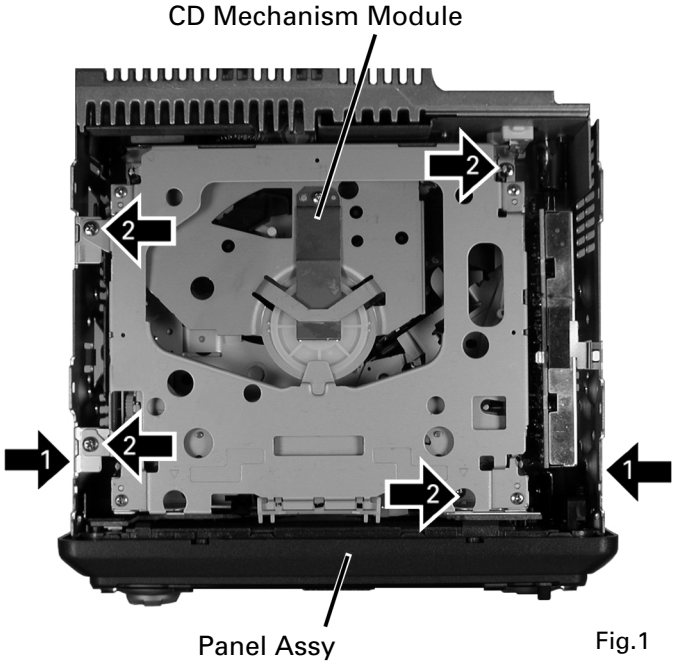


Fig.1

● **Removing the Tuner Amp Unit (Fig.2)**

1 Remove the two screws.

2 Remove the three screws.

3 Straight the tabs at three locations indicated.

4 Remove the screw and then remove the Tuner Amp Unit.

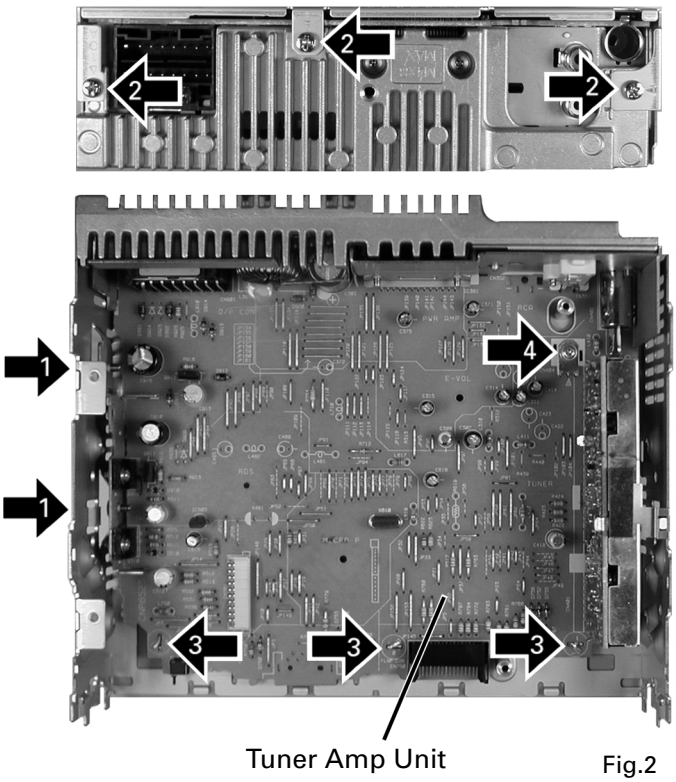
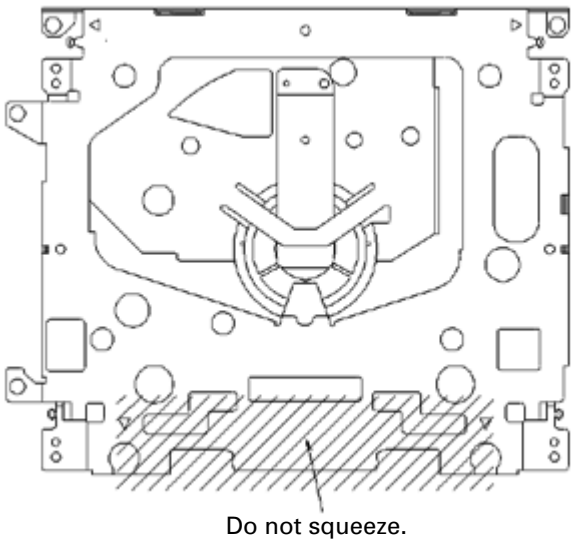


Fig.2

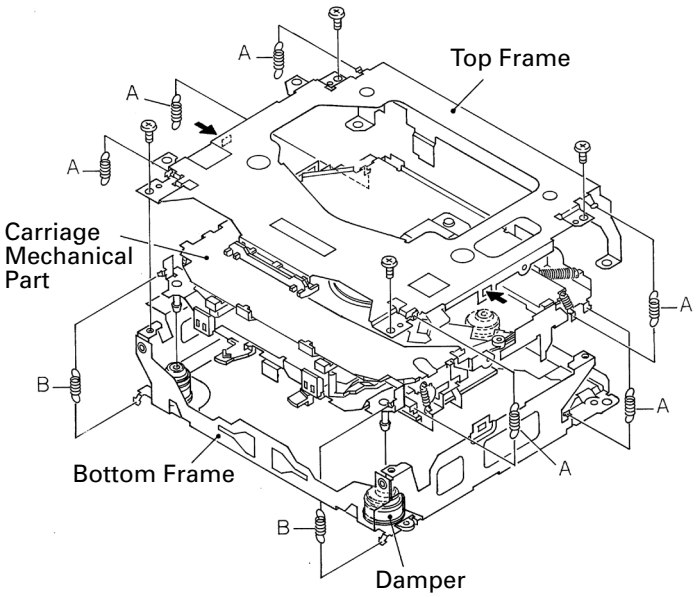
● How to hold the Mechanical Unit

1. Hold the top and bottom frame.
2. Do not squeeze top frame's front portion too tight, because it is fragile.



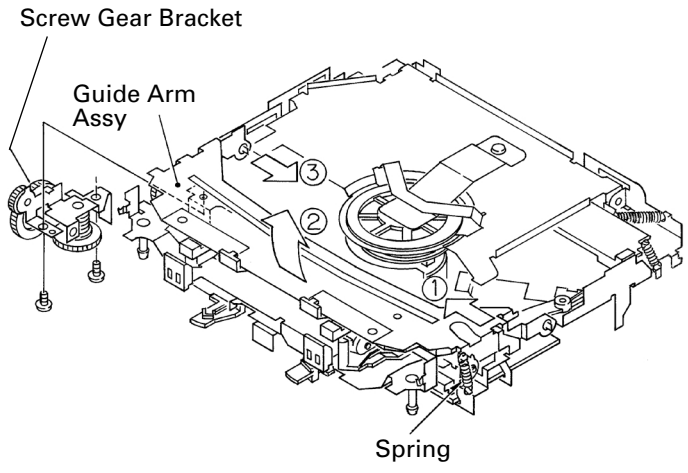
● How to remove the Top and Bottom Frame

1. When the disk is in "clamp" state, unlock Spring A (6 pieces) and Spring B (2 pieces), and unscrew screws (4 pieces).
2. Unlock each 1 of pawl at the both side of the frame, then remove the top frame.
3. Remove the Carriage Mechanical part in such way that; you remove the mechanical part from 3 pieces of Damper while slowly pulling up the part.
4. Now, the top frame has been removed, and under this state, fix the genuine Connector again, and eject the disk.
   (Caution)
   When you reassemble the Carriage Mechanical part, apply a bit of alcohol to Dampers.



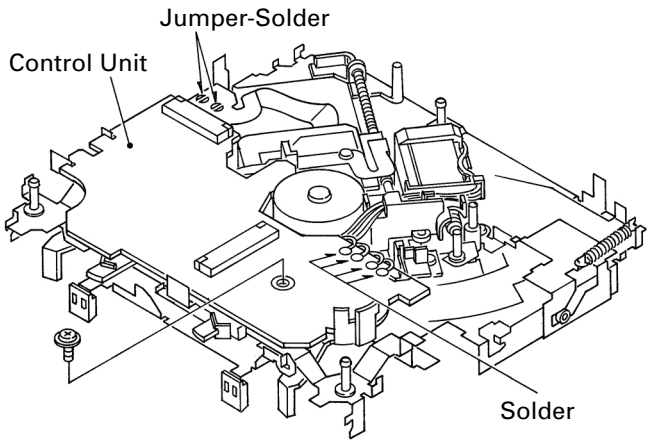
● How to remove the Guide Arm Assy

1. Unlock the spring (1 piece) at the right side of the assembly.
2. Unscrew screws (2 pieces), then remove the Screw Gear Bracket.
3. Shift the Guide Arm Assy to the left and slowly rotate it to the upper direction.
4. When the Guide Arm Assy rotates approximately 45 degree, shift the Assy to the right side direction and remove it.



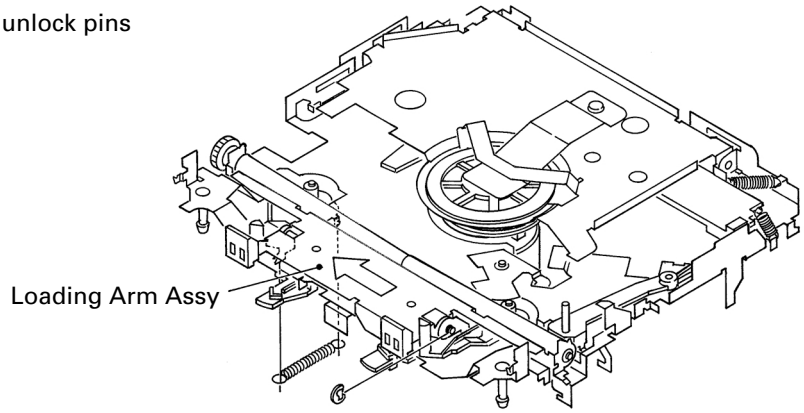
● How to remove the Control Unit

1. Give jumper-solder treatment to the Flexible Wire of the Pickup unit, then remove the wire from the Connector.
2. Remove all 4 points of solder-treatment on the Lead Wire. Also, unscrew the screw(1 piece).
3. Then, Remove the Control unit.
   (Caution)
   Be careful not to damage SW when you reassemble the Control Unit into the device.



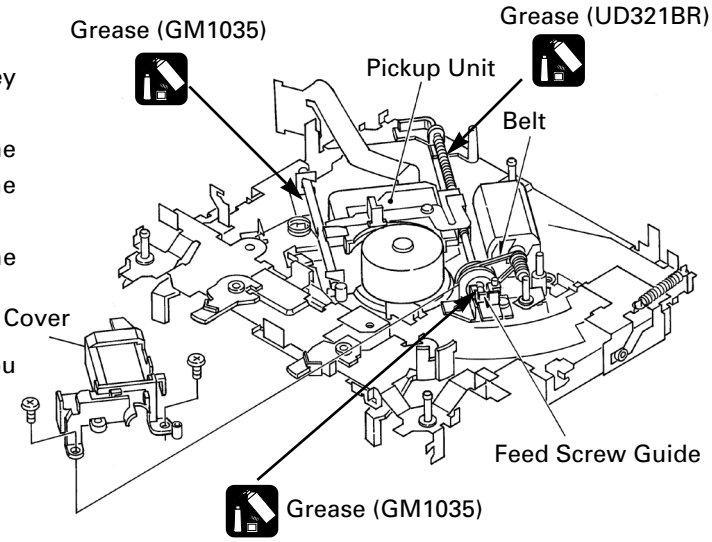
● How to remove the Loading Arm Assy

1. Unlock the spring (1 piece) and remove the E ring (1 piece) of the Fulcrum Shaft.
2. Shift the arm to the left side direction and unlock pins (2 pieces).

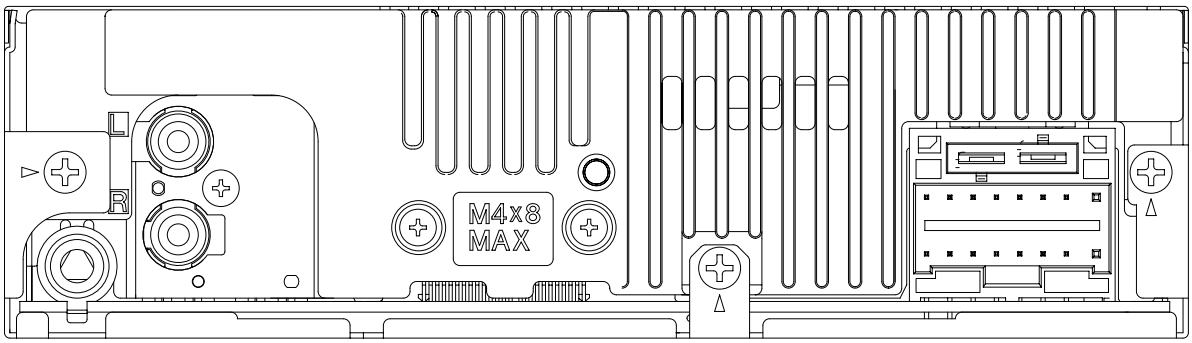


● How to remove the Pickup Unit

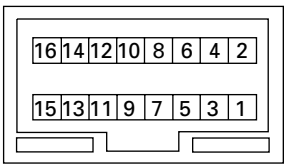
1. Unscrew 2 pieces of screws, then remove the Pulley Cover.
2. Remove the Feed Screw unit from the pawl of the Feed Screw Guide (The pawl is located inside the guide).
3. Remove the belt from the Pulley, then remove the Pickup unit.
   (Caution)
   Make sure not to stain the belt with grease when you fix the belt.



7.1.2 CONNECTOR FUNCTION DESCRIPTION



ANTENNA PRE OUT



1. GND
2. BACK UP
3. ACC
4. NC
5. NC
6. B.REM
7. NC
8. NC
9. RL-
10. FL-
11. RL+
12. FL+
13. RR-
14. FR-
15. RR+
16. FR+

7.2 PARTS

7.2.1 IC

● **Pin Functions(PE5262A)**

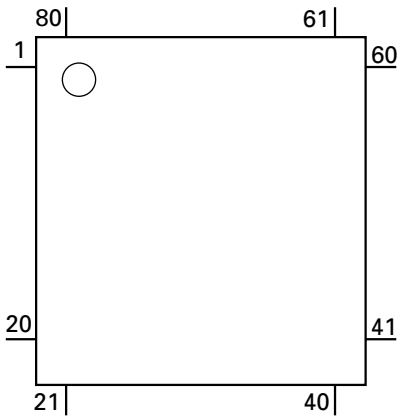
Pin No.	Pin Name	I/O	Format	Function and Operation
1	MODEL1	I		Model select input
2,3	NC			Not used
4	AVSS	I		A/D GND
5	ST	I		FM stereo input
6	SD	I		SD input
7	AVREF1			A/D converter reference voltage
8	KYDT	I		Key data input
9	DPDT	O	C	Display data output
10	SDBW	I		SDBW input
11	TUNPDI	I		PLL IC data input
12	TUNPDO	O	C	PLL IC data output
13	TUNPCK	O	C	PLL IC clock output
14	TUNPCE	O	C	PLL IC chip enable output
15	$\overline{\text{CURRQ}}$	O		Tuner voltage FIX output
16	LOCL	O	C	Local L output
17	NC			Not used
18	$\overline{\text{FM}}$/AM	O	C	FM/AM power select output
19	NC			Not used
20	FLPILM	O	C	Inside of flap illumination output
21	VDCONT	O	C	VD control output
22	NC			Not used
23	CONT	O	C	Servo driver power supply control output
24	XCE	O	C	CD LSI chip enable output
25	$\overline{\text{XRST}}$	O	C	CD LSI reset output
26	XPCK	O	C	CD LSI clock output
27-30	XPI0-3	I/O	C	CD LSI data input/output
31	CLCONT	O	C	Driver input select output
32	HOME	I	C	Home position detector input
33	VSS			GND
34	LOEJ	O	C	CD load motor LOAD/EJECT direction exchange output
35	CD5VON	O	C	CD +5V power supply control output
36,37	ROT1-0	I		Rotary encoder data input
38	TELIN	I		Telephone mute input
39	NC			Not used
40	ILMPW	O	C	Illumination power supply control output
41	$\overline{\text{SWVDD}}$	O	C	Keyboard unit power supply control output
42	SYSPW	O	C	System power supply control output
43	VST	O	C	Strobe pulse output for electronic volume
44	$\overline{\text{MUTE}}$	O	C	System mute output
45	PEE	O	C	Beep tone output
46	LOCH	O	C	Local H output
47	NC			Not used
48	TUNPCE2	O	C	EEPROM chip enable output
49	PCL	O	C	Clock adjustment output
50	VCK	O	C	Clock output for electronic volume
51	VDT	O	C	Data output for electronic volume
52	ANTPW	O		Antenna output
53	EJECTS	I		Eject key input pin
54	DALMON	O	C	Stand-by output
55–59	NC			Not used
60	$\overline{\text{RESET}}$	I		Reset input
61,62	NC			Not used
63	$\overline{\text{BSENS}}$	I		Back up power sense input
64	$\overline{\text{ASENS}}$	I		ACC power sense input
65	$\overline{\text{DSENS}}$	I		Grille detach sense
66	ADPW	O	C	A/D converter power supply output
67	NC			Not used

Pin No.	Pin Name	I/O	Format	Function and Operation
68	VDD			Power supply
69	X2			Crystal oscillator connection pin
70	X1	I		Crystal oscillator connection pin
71	IC(VPP)			Connect to GND
72	NC			Not used
73	TESTIN	I		Test program mode input
74	AVDD			Positive power supply terminal for analog circuit
75	AVREF0			A/D converter reference voltage
76	SL	I		SD level input from tuner
77	TEMP	I		CD temperature sense input
78	VDSENS	I		VD power supply voltage sense input
79	DISCSNS	I		CD DISC sense input
80	CSENS	I		Flap open/close sense input

Output Format	Meaning
C	C MOS output

IC's marked by * are MOS type.
Be careful in handling them because they are very liable to be damaged by electrostatic induction.

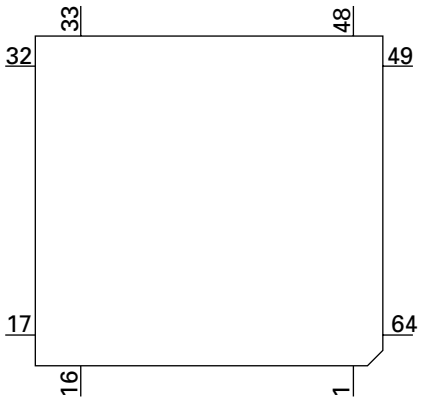
*PE5262A



● **Pin Functions (PD6340A)**

Pin No.	Pin Name	I/O	Function and Operation
1-5	SEG4-0	O	LCD segment output
6-9	COM3-0	O	LCD common output
10	VLCD		LCD drive power supply
11-14	KST3-0	O	Key strobe output
15,16	KDT0,1	I	Key data input (analogue input)
17	REM	I	Remote control reception
18	DPDT	I	Display data input
19	NC		Not used
20	KYDT	O	Key data output
21	MODA		GND
22	X0		Crystal oscillator connection pin
23	X1		Crystal oscillator connection pin
24	VSS		GND
25,26	KDT2,3	I	Key data input
27	NC		Not used
28	KST4	O	Key strobe output
29-32	NC		Not used
33-55	SEG35-13	O	LCD segment output
56	VDD		Power supply
57-64	SEG12-5	O	LCD segment output

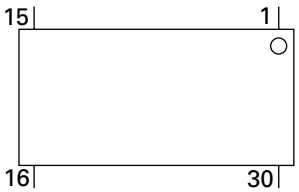
*PD6340A



● **Pin Functions(TA2153FN)**

Pin No.	Pin Name	I/O	Function and Operation
1	VCC		Power supply voltage terminal
2	RFGC	I	RF amplitude adjustment control signal terminal
3	GMAD	I	AGC amplifier frequency characteristic adjustment terminal
4	FNI	I	Main beam amplifier input terminal
5	FPI	I	Main beam amplifier input terminal
6	TPI	I	Sub beam amplifier input terminal
7	TNI	I	Sub beam amplifier input terminal
8	MDI	O	Monitor photodiode amplifier input terminal
9	LDO	I	Laser diode amplifier output terminal
10	SEL	I	APC circuit ON/OFF signal, LDO terminal control input terminal and bottom and peak detection frequency switching terminals
11	TEB	I	Tracking error balance adjustment signal input terminal
12	2VRO	O	Reference voltage (2VRO) output terminal
13	TEN	I	Tracking error signal generation amplifier reverse phase input terminal
14	TEO	O	Tracking error signal generation amplifier output terminal
15	SBAD	O	Sub beam addition signal output terminal
16	FEO	O	Focus error signal generation amplifier output terminal
17	FEN	I	Focus error signal generation amplifier reverse phase input terminal
18	SEB	I	RFRP generation circuit mode switching terminal
19	VRO	O	Reference voltage (VREF) output terminal
20	RFRP	O	Signal generation amplifier output terminal for track count
21	BTC	I	Bottom detection time constant adjustment terminal for RFCT signal generation
22	RFCT	O	RFRP signal center level output terminal
23	PKC	I	Peak detection time constant adjustment signal for RFCT signal generation
24	RFRPIN	I	Signal generation amplifier input terminal for track count
25	RFGO	O	RF signal amplitude adjustment amplifier output terminal
26	GVSW	I	AGC, FE or TE amplifier gain switching terminal
27	AGCIN	I	RF signal amplitude adjustment amplifier input terminal
28	RFO	O	RF signal generation amplifier output terminal
29	GND	I	GND terminal
30	RFN2	I	RF signal generation amplifier input terminal

TA2153FN

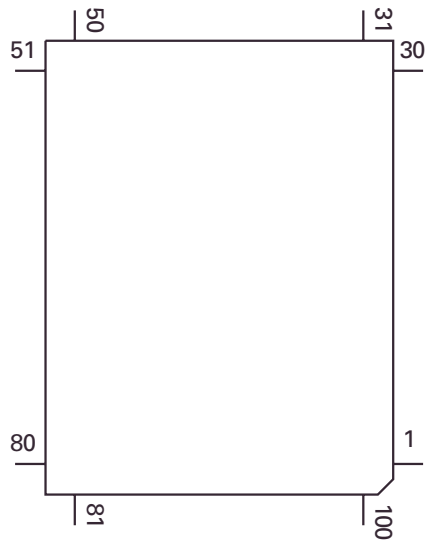


● **Pin Functions(TC9495F2)**

Pin No.	Pin Name	I/O	Function and Operation
1	TESTO		Test mode terminal
2	$\overline{\text{HSO}}$	O	Replay speed flag output terminal
3	$\overline{\text{UHSO}}$	O	Replay speed flag output terminal
4	EMPH	O	Emphasis flag output terminal for sub code Q data
5	LRCK	O	Channel clock (44.1 kHz) output terminal
6	VSS		Digital ground terminal
7	BCK	O	Bit clock output terminal
8	AOUT	O	Digital audio data output terminal
9	DOUT	O	Digital out output terminal
10	MBOV	O	Buffer memory over signal output terminal
11	IPF	O	Correction flag output terminal
12	SBOK	O	CRCC decision result output for sub code Q data
13	CLCK	I/O	Clock input/output terminal for sub code P-W data read
14	VDD		Digital + power supply terminal (5 V)
15	VSS		Digital ground terminal
16	DATA	O	Sub code P-W data output terminal
17	SFSY	O	Replay-system frame sync signal output terminal
18	SBSY	O	Sub code block sync output terminal
19	SPCK	O	Clock for processor status signal read
20	SPDA	O	Processor status signal output terminal
21	COFS	O	Correction-system frame clock (7.35 kHz) output terminal
22	MONIT	O	LSI internal signal output terminal
23	VDD		Digital + power supply terminal (5 V)
24	TESIO0	I	Test input/output terminal
25	P2VREF		PLL-system only 2VREF terminal
26	HSSW	O	The VREF voltage is reached for double or quad speed.
27	ZDET	O	One-bit DAC zero detection flag output terminal
28	PDO	O	Phase error signal issue between the EFM and PLCK signals
29	TMAXS	O	TMAX detection result output terminal
30	TAMX	O	TMAX detection result output terminal
31	LPFN	I	Reverse input terminal of amplifier for lowpass filter
32	LPFO	O	Output terminal of amplifier for lowpass filter
33	PVREF		PLL-system only VREF terminal
34	VCOREF	I	VCO center frequency reference level terminal
35	VCOF	O	Filter terminal for VCO
36	AVSS		Analog-system ground terminal
37	SLCO	O	Output terminal of DAC for data slice level generation
38	RFI	I	RF signal input terminal
39	AVDD		Analog-system power supply terminal (5 V)
40	RFCT	I	RFRP signal center level input terminal
41	RFZI	I	Input terminal for RFRP signal zero cross
42	RFRP	I	RF ripple signal input terminal
43	FEI	I	Focus error signal input terminal
44	SBAD	I	Sub beam addition signal input terminal
45	TSIN	I	Test input terminal
46	TEI	I	Tracking error input terminal
47	TEZI	I	Input terminal for tracking error or zero cross
48	FOO	O	Focus equalizer output terminal
49	TRO	O	Tracking equalizer output terminal
50	VREF		Analog reference power supply terminal
51	RFGC	O	RF amplitude adjustment control signal output terminal
52	TEBC	O	Tracking balance control signal output terminal
53	FMO	O	Feed equalizer output terminal
54	FVO	O	Speed error signal or feed search EQ output
55	DMO	O	Disc equalizer output terminal
56	2VREF		Analog reference power supply terminal
57	SEL	O	APC circuit ON/OFF signal output terminal

Pin No.	Pin Name	I/O	Function and Operation
58-61	FLGA-D	O	External flag output terminal for internal signal monitor
62	VDD		Digital + power supply terminal (5 V)
63	VSS		Digital ground terminal
64	IO0	O	RF amplifier gain switching terminal
65	IO1	O	Not used
66	IO2	I	HOME detection switch input terminal
67	IO3	O	FocusDrv and signal output terminal
68	$\overline{\text{DMOUT}}$	I	Field equalizer PWM output terminal for IO0 and IO1 Disc equalizer PWM output terminal for IO2 and IO3
69	$\overline{\text{CKSE}}$	I	Usually open
70	$\overline{\text{DACT}}$	I	DAC test mode terminal
71	TESIN	I	Test input terminal
72	TESIO1	I	Test input/output terminal
73	VSS		Digital ground terminal
74	PXI	I	DPS-system clock oscillator circuit input terminal
75	PXO	O	DPS-system clock oscillator circuit output terminal
76	VDD		Digital + power supply terminal (5 V)
77	XVSS		Ground terminal for system clock oscillator circuit
78	XI	I	System clock oscillator circuit input terminal
79	XO	O	System clock oscillator circuit output terminal
80	XVDD		For system clock oscillator circuit + power supply terminal
81	DVSR		R channel D/A converting unit power supply terminal
82	RO	O	R channel data forward rotation output terminal
83	DVDD		D/A converting unit power supply terminal (5 V)
84	DVR		Reference voltage terminal
85	LO	O	L channel forward rotation output terminal
86	DVSL		L channel D/A converting unit power supply terminal
87-89	TEST1-3	I	Test mode terminal
90-93	BUS0-3	I/O	Data input/output terminal for microcomputer interface
94	VDD		Digital + power supply terminal (5 V)
95	VSS		Digital ground terminal
96	BUCK	I	Clock terminal for microcomputer interface
97	$\overline{\text{CEE}}$	I	Chip enable signal for microcomputer interface
98	TEST4	I	Test mode terminal
99	$\overline{\text{TSMOD}}$	I	Test mode terminal
100	$\overline{\text{RST}}$	I	Reset signal input terminal

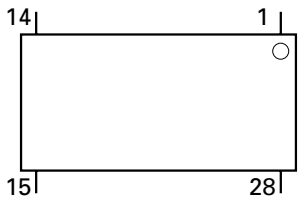
*TC9495F2



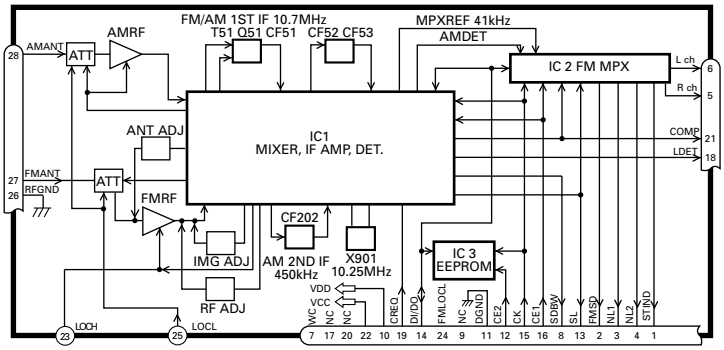
● **Pin Functions(BA5996FM)**

Pin No.	Pin Name	Function and Operation
1	VR	Input pin for reference voltage
2	OPIN2(+)	Input pin for non-inverting input for CH2 preamplifier
3	OPIN2(-)	Input pin for inverting input for CH2 preamplifier
4	OPOUT2	Output pin for CH2 preamplifier
5	OPIN1(+)	Input pin for non-inverting input for CH1 preamplifier
6	OPIN1(-)	Input pin for inverting input from CH1 preamplifier
7	OPOUT1	Output pin for CH1 preamplifier
8	GND	Ground pin
9	MUTE	Mute control pin
10	POWVCC1	Power supply pin for CH1, CH2, and CH3 at "Power" stage
11	VO1(-)	Driver CH1 - Negative output
12	VO1(+)	Driver CH2 - Positive output
13	VO2(-)	Driver CH2 - Negative output
14	VO2(+)	Driver CH2 - Positive output
15	VO3(+)	Driver CH2 - Positive output
16	VO3(-)	Driver CH2 - Negative output
17	VO4(+)	Driver CH4 - Positive output
18	VO4(-)	Driver CH4 - Negative output
19	POWVCC2	Power supply pin for CH4 at "Power" stage
20	GND	Ground pin
21	CNT	Control pin
22	LDIN	Loading input
23	OPOUTSL	Output pin for preamplifier for thread
24	OPINSL	Input pin for preamplifier for thread
25	OPOUT3	CH3 preamplifier output pin
26	OPIN3(-)	Input pin for inverting input for CH3 preamplifier
27	OPIN3(+)	Input pin for non-inverting input for CH3 preamplifier
28	PREVCC	PreVcc

BA5996FM



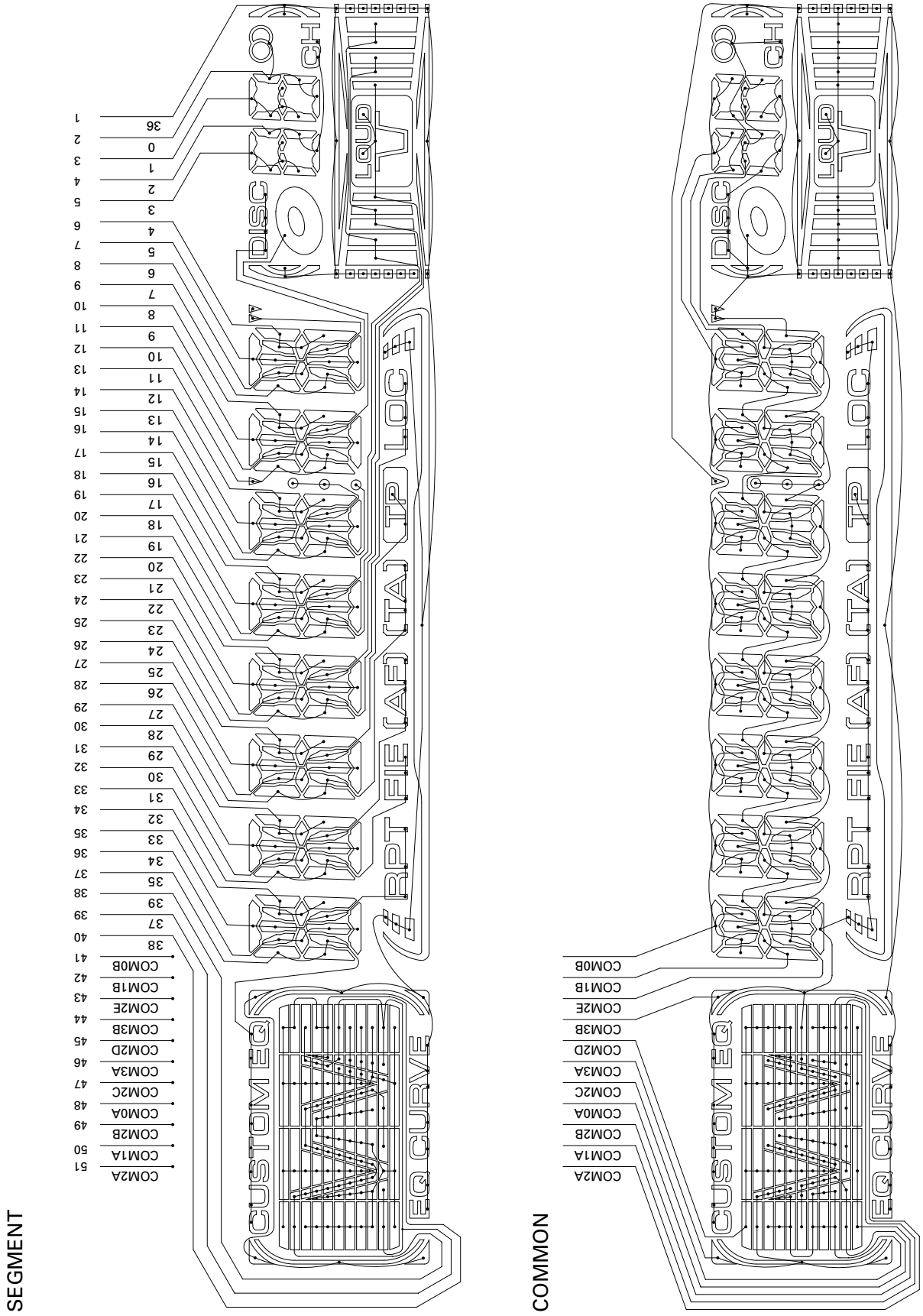
● FM/AM Tuner Unit



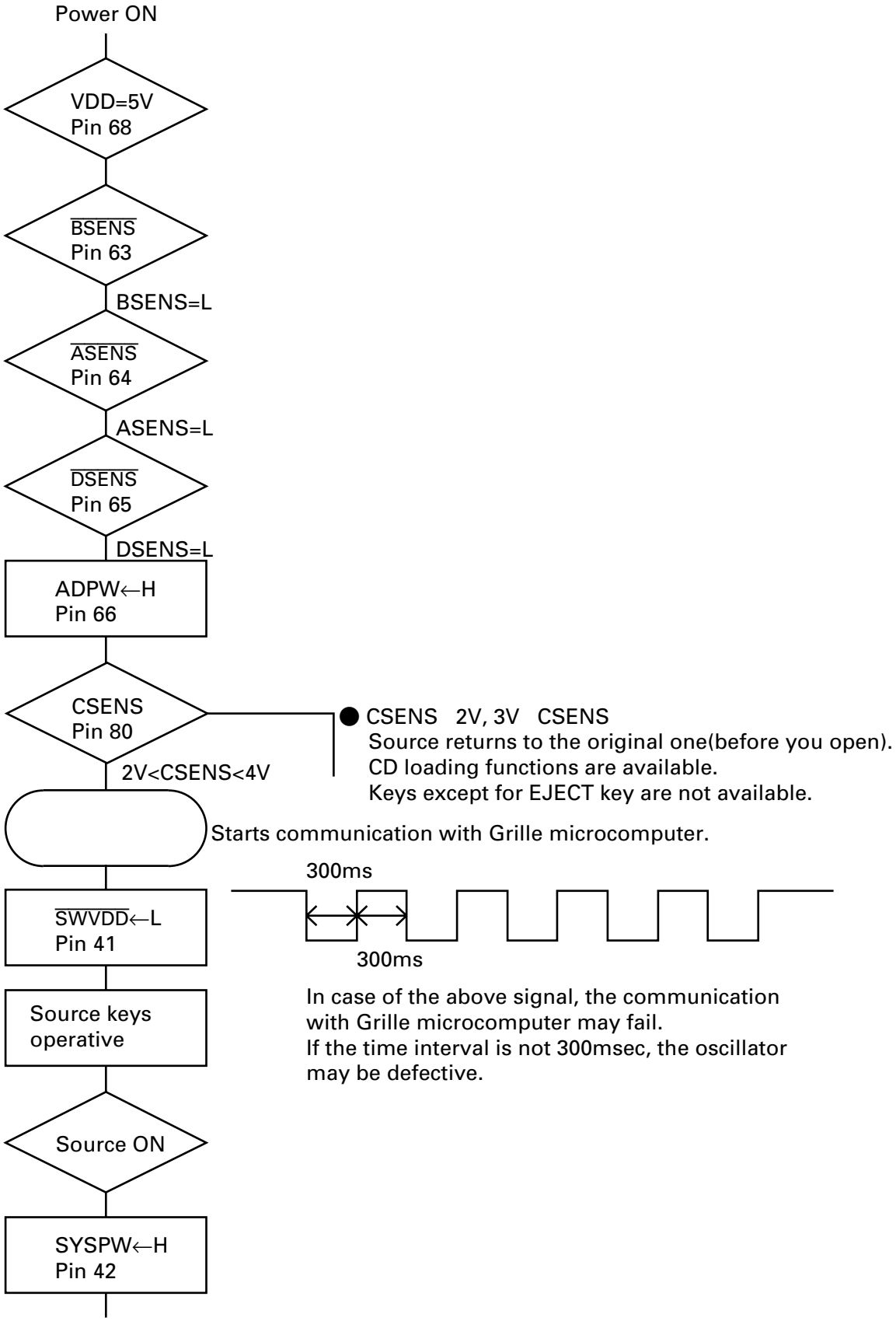
No.	Symbol	I/O	Explain	
1	STIND	O	stereo indicator	"Low" when the FM stereo signals are received. To be pulled up to the "VDD" at 47kΩ.
2	FMSD	O	FM station detector	"High" when signals are received. To be pulled up to the "VDD" at 47kΩ Meanwhile, 10kΩ should be used when taking diver FIX trigger from here and "High: 0.9VDD or more" and "Low: 250mV or less". (Should satisfy the diver IC specifications)
3	NL1	O	noise level-1	"High" when noise is received. Output for the RDS. GND at 47kΩ //1,800pF.
4	NL2	O	noise level-2	"High" when noise is received. Output for the RDS. GND at 36kΩ //330pF.
5	Rch	O	R channel output	FM stereo "R-ch" signal output or AM audio output. Add the specified de-emphasis constant.
6	Lch	O	L channel output	FM stereo "L-ch" signal output or AM audio output. Add the specified de-emphasis constant.
7	WC		write control	EEPROM write control. Writing permissible at "Low". Normally open.
8	SDBW	O	SD bandwidth	SD bandwidth signal output. For detection of detuning data for the RDS.
9	NC			Not used
10	VDD		power supply	Power supply pin for the digital section. DC 5V +/- 0.25V. Be careful about overlapping noise in the logic section.
11	DGND		digital ground	Grounding for the digital section.
12	CE2	I	chip enable-2	EEPROM chip enable. Active a "Low" To be pulled up to the "VDD" at 47kΩ
13	SL	I/O	signal level	Received FM/AM signal level (strength) output. Connect the specified load resistor and capacitor (10k Ω + 39k Ω //4,700pF)
14	DI/DO	I/O	data input/ data output	Data input/Data output To be pulled up to the "VDD" at 47kΩ
15	CK	I	clock	Clock input To be pulled up to the "VDD" at 47kΩ
16	CE1	I	chip enable-1	AF·RF chip enable. Active at "High" To be grounded at 47kΩ
17	NC			Not used
18	LDET	O	lock detector	Active at "Low". To be pulled up to the "VDD" at 47kΩ
19	CREQ	I	current request	Active at "Low". To be grounded at 47kΩ
20	NC			Not used
21	COMP	O	composite signal	FM composite signal output. r out < 100Ω
22	VCC		power supply	Analog section power supply pin.DC 8.4V +/- 0.3V
23	LOCH	I	local high	FM local high pin. When seeking local high, apply 5V together with "LOCL".
24	FMLOCL	I	FM local low	FM local low pin. When seeking local low, apply 5V to the base of the NPN transistor with which the specified resistor is being connected to the emitter. Keep it open in case of ordinary marketed models.
25	LOCL	I	local low	FM/AM local low pin. When seeking local low, apply 5V to the base of the NPN transistor. Since this pin is exclusive for AM when the FMLOCL is in use, do not drive it under FM.
26	RFGND		RF ground	Grounding for the antenna section.
27	FMANT	I	FM antenna input	FM antenna input. 75Ω. Surge absorber (DSP-201M-S00B) is necessary.
28	AMANT	I	AM antenna input	AM antenna input. High impedance. Connect to the antenna through an L (LAU type) of 4.7μH.To cope with the power transmission line hums, insert a series circuit consisting of an L (a coil of about 100mH) + R (a resistor of 470 Ω to 2.2kΩ) between the GND.

7.2.2 DISPLAY

● **CAW1724(DEH-240F/XN/UC, DEH-2400F/XN/UC), CAW1719(DEH-24F/XN/UC)**



7.3 OPERATIONAL FLOW CHART



Completes power-on operation.(After that, proceed to each source operation.)

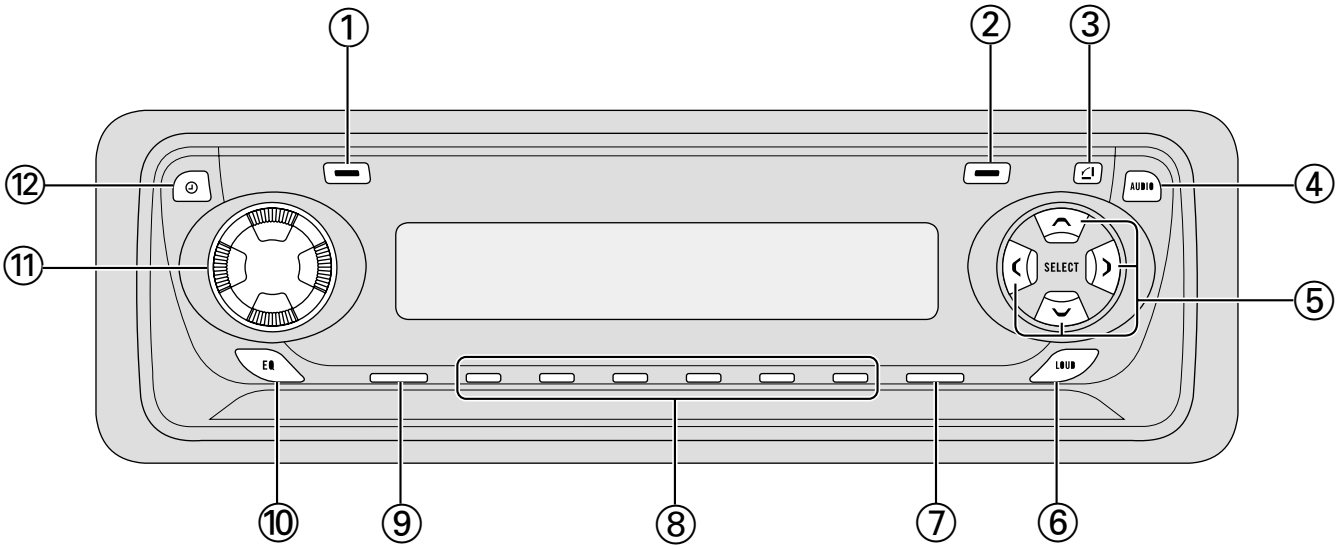
7.4 CLEANING

Before shipping out the product, be sure to clean the following portions by using the prescribed cleaning tools:

Portions to be cleaned	Cleaning tools
CD pickup lenses	Cleaning liquid : GEM1004 Cleaning paper : GED-008

8. OPERATIONS AND SPECIFICATIONS

8.1 OPERATIONS



What's what

① BSM button
Press and hold for two seconds to switch BSM function on or off.

② LOCAL button
Press to switch local function on or off.

③ OPEN button
Press to open the front panel.

④ AUDIO button
Press to select various sound quality controls.

⑤ ▲/▼/◄/► buttons
Press to do manual seek tuning, fast forward, reverse and track search controls. Also used for controlling functions.

⑥ LOUDNESS button
Press to switch loudness function on or off.

⑦ BAND button
Press to select among three FM and one AM band and cancel the control mode of functions.

⑧ 1–6 (PRESET TUNING) buttons
Press for preset tuning.

⑨ SOURCE button
This unit is switched on by selecting a source. Press to cycle through all of the available sources.

⑩ EQ button
Press to select various equalizer curves.

⑪ VOLUME
Rotate to increase or decrease the volume.

⑫ CLOCK button
Press to switch clock display on or off. ▣

Power ON/OFF

Turning the unit on

Press SOURCE to turn the unit on.
When you select a source the unit is turned on. ▣

Selecting a source

You can select a source you want to listen to. To switch to the built-in CD player, load a disc in this unit.

Press SOURCE to select a source.
Press SOURCE repeatedly to switch between the following sources:
Built-in CD player—Tuner

Notes

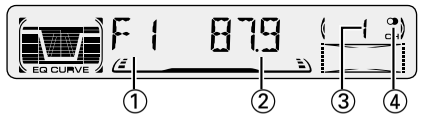
- When no disc is set in this product, built-in CD player source will not change.
- When this unit's blue/white lead is connected to the car's auto-antenna relay control terminal, the car's antenna extends when this unit's source is switched on. To retract the antenna, switch the source off. ▣

Turning the unit off

Press SOURCE and hold for at least one second to turn the unit off. ▣

Tuner

Listening to the radio



① BAND indicator
Shows which band the radio is tuned to, AM or FM.

② FREQUENCY indicator
Shows to which frequency the tuner is tuned.

③ PRESET NUMBER indicator
Shows what preset has been selected.

④ STEREO (◯◯) indicator
Shows that the frequency selected is being broadcast in stereo.

1 Press SOURCE to select the tuner.

2 Use VOLUME to adjust the sound level.
Rotate to increase or decrease the volume.

3 Press BAND to select a band.
Press BAND until the desired band is displayed, F1, F2, F3 for FM or AM.

4 To perform manual tuning, press ◄ or ► with quick presses.
The frequencies move up or down step by step.

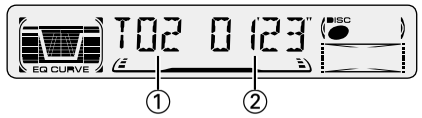
5 To perform seek tuning, press and hold ◄ or ► for about one second and release.
The tuner will scan the frequencies until a broadcast strong enough for good reception is found.
- You can cancel seek tuning by pressing either ◄ or ► with a quick press.
- If you press and hold ◄ or ► you can skip broadcasting stations. Seek tuning starts as soon as you release the buttons.

Note

- When the frequency selected is being broadcast in stereo the STEREO (◯◯) indicator will light. ▣

Built-in CD player

Playing a CD

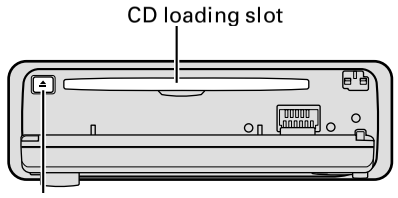


① TRACK NUMBER indicator
Shows the track currently playing.

② PLAY TIME indicator
Shows the elapsed playing time of the current track.

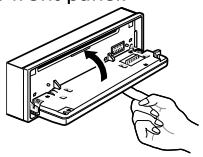
1 Press OPEN to open the front panel.
CD loading slot appears.

2 Insert a CD into the CD loading slot.
Playback will automatically start.



- You can eject a CD by pressing CD EJECT.

3 Close the front panel.



- After a CD has been inserted, press SOURCE to select the built-in CD player.

Built-in CD player

4 Use VOLUME to adjust the sound level.
Rotate to increase or decrease the volume.

5 To perform fast forward or reverse, press and hold ◄ or ►.

6 To skip back or forward to another track, press ◄ or ►.
Pressing ► skips to the start of the next track. Pressing ◄ once skips to the start of the current track. Pressing again will skip to the previous track.

Notes

- The built-in CD player plays one, standard, 12-cm or 8-cm (single) CD at a time. Do not use an adapter when playing 8-cm CDs.
- Do not insert anything other than a CD into the CD loading slot.
- If you cannot insert a disc completely or if after you insert a disc the disc does not play, check that the label side of the disc is up. Press CD EJECT to eject the disc, and check the disc for damage before inserting the disc again.
- If the built-in CD player does not operate properly, an error message such as ERROR-14 may be displayed. ▣

Playing tracks in a random order

Random play lets you play back tracks on the CD in a random order.

1 Press 4 to turn random play on.
RDM appears in the display. Tracks will play in a random order.

2 Press 4 to turn random play off.
Tracks will continue to play in order. ▣

Repeating play

Repeat play lets you hear the same track over again.

1 Press 5 to turn repeat play on.
RPT appears in the display. The track presently playing will play and then repeat.

2 Press 5 to turn repeat play off.
The track presently playing will continue to play and then play the next track.

Note

- If you perform track search or fast forward/reverse, repeat play is automatically cancelled. ▣

Pausing CD playback

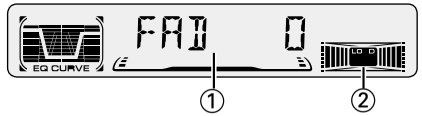
Pause lets you temporarily stop playback of the CD.

1 Press 6 to turn pause on.
PAUSE appears in the display. Play of the current track pauses.

2 Press 6 to turn pause off.
Play will resume at the same point that you turned pause on. ▣

Audio Adjustments

Introduction of audio adjustments



① AUDIO display
Shows the audio adjustments status.

② LOUD indicator
Appears in the display when loudness is turned on.

Press AUDIO to display the audio function names.
Press AUDIO repeatedly to switch between the following audio functions:
FAD (balance adjustment)—EQ-L (equalizer)—LOUD (loudness)—FIE (front image enhancer)—SLA (source level adjustment)

- When selecting the FM tuner as the source, you cannot switch to SLA.
- To return to the display of each source, press BAND.

Note

- If you do not operate the audio function within about 30 seconds, the display is automatically returned to the source display. ▣

Using balance adjustment

You can select a fader/balance setting that provides an ideal listening environment in all occupied seats.

1 Press AUDIO to select FAD.
Press AUDIO until FAD appears in the display.

- If the balance setting has been previously adjusted, BAL will be displayed.

2 Press ▲ or ▼ to adjust front/rear speaker balance.
Each press of ▲ or ▼ moves the front/rear speaker balance towards the front or the rear.

- FAD F15 – FAD R15 is displayed as the front/rear speaker balance moves from front to rear.
- FAD 0 is the proper setting when only two speakers are used.

3 Press ◄ or ► to adjust left/right speaker balance.
When you press ◄ or ►, BAL 0 is displayed.
Each press of ◄ or ► moves the left/right speaker balance towards the left or the right.

- BAL L9 – BAL R9 is displayed as the left/right speaker balance moves from left to right. ▣

Using the equalizer

The equalizer lets you adjust the equalization to match car interior acoustic characteristics as desired.

Recalling equalizer curves

There are six stored equalizer curves which you can easily recall at any time. Here is a list of the equalizer curves:

Display	Equalizer curve
SPR-BASS	Super bass
POWERFUL	Powerful
NATURAL	Natural
VOCAL	Vocal
CUSTOM	Custom
EQ FLAT	Flat

- CUSTOM is an adjusted equalizer curve that you create.
- When EQ FLAT is selected no supplement or correction is made to the sound. This is useful to check the effect of the equalizer curves by switching alternatively between EQ FLAT and a set equalizer curve.

Press EQ to select the equalizer.
- If the equalizer has been previously set to an equalizer curve other than POWERFUL then the title of that previously selected equalizer curve will be displayed, such as SPR-BASS, NATURAL, VOCAL, CUSTOM, or EQ FLAT. ▣

Adjusting equalizer curves

You can adjust the currently selected equalizer curve setting as desired. Adjusted equalizer curve settings are memorized in CUSTOM.

1 Press AUDIO to select the equalizer mode.
Press AUDIO until EQ-L/EQ-M/EQ-H appears in the display.

2 Select the band you want to adjust with the ◄/►.
EQ-L (low) —EQ-M (mid) —EQ-H (high)

3 Press ▲ or ▼ to adjust the equalizer curve.
Each press of ▲ or ▼ increases or decreases the equalizer curve respectively.
- +6 – –6 is displayed as the equalizer curve is increased or decreased.
- The actual range of the adjustments are different depending on which equalizer curve is selected.

Note
- If you make adjustments when a curve other than CUSTOM is selected, the newly adjusted curve will replace the previous curve. Then a new curve with CUSTOM appears on the display while selecting the equalizer curve. ▣

Adjusting loudness

Loudness compensates for deficiencies in the low- and high-sound ranges at low volume.

1 Press AUDIO to select LOUD.
Press AUDIO until LOUD appears in the display.

2 Select LOUD on or off with ▲/▼.

3 Select the desired level with ◄/►.
LOW (low) —MID (mid) —HI (high)

Note
- You can also switch LOUD on or off by pressing the LOUDNESS. ▣

Front image enhancer (FIE)

The F.I.E. (Front Image Enhancer) function is a simple method of enhancing front imaging by cutting mid- and high-range frequency output from the rear speakers, limiting their output to low-range frequencies. You can select the frequency you want to cut.

Precaution
- When the F.I.E. function is deactivated, the rear speakers output sound of all frequencies, not just bass sounds. Reduce the volume before disengaging F.I.E. to prevent a sudden increase in volume.

1 Press AUDIO to select FIE.
Press AUDIO until FIE appears in the display.

2 Select FIE on or off with ▲/▼.

3 Select the desired frequency with ◄/►.
100—160—250 (Hz)

Notes
- After switching the F.I.E. function ON, select the Fader/Balance mode in the Audio Menu, and adjust front and rear speaker volume levels until they are balanced.
- Switch the F.I.E. function OFF when using a 2-speaker system. ▣

Adjusting source levels

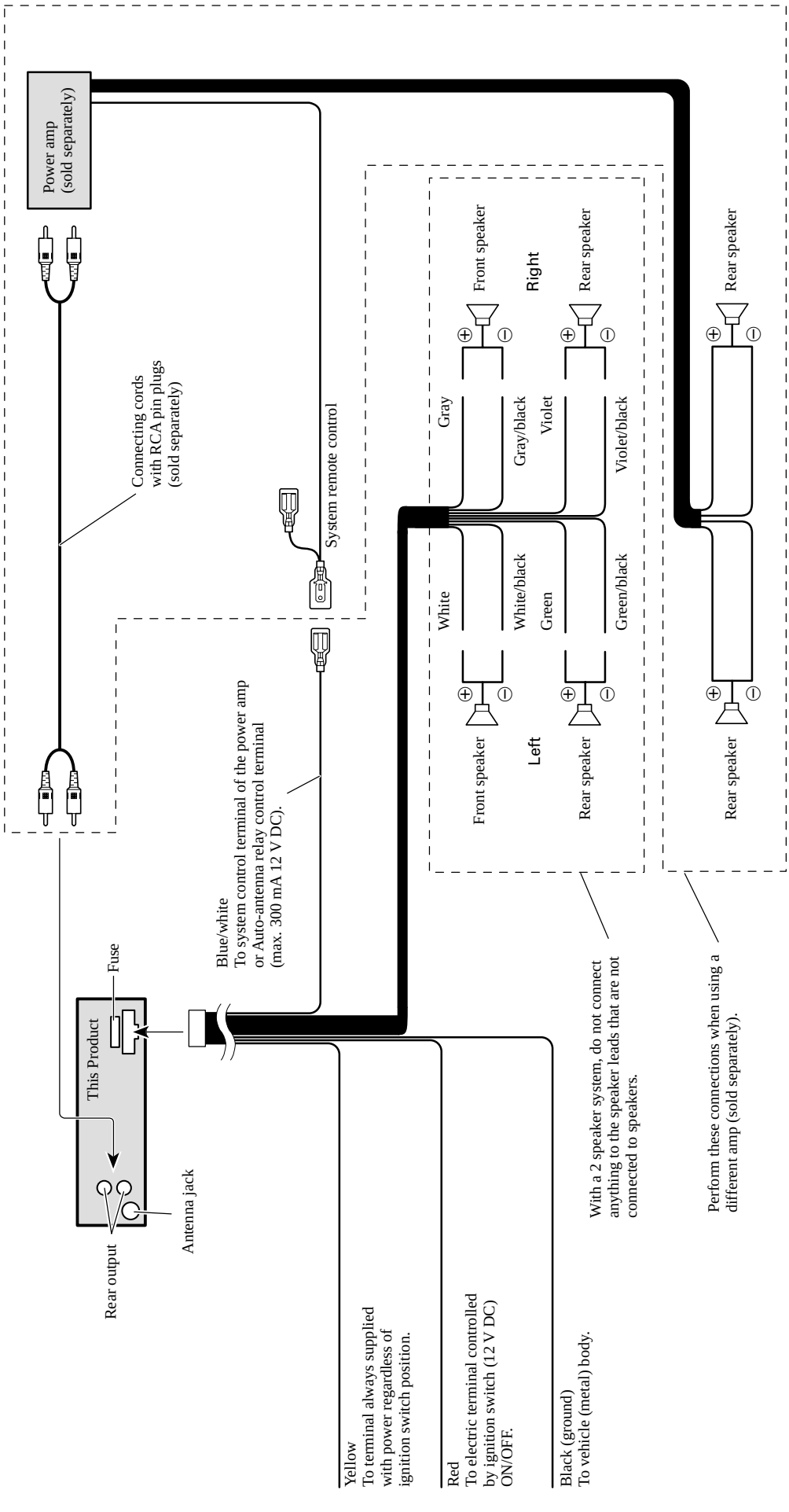
SLA (Source level adjustment) lets you adjust the volume level of each source to prevent radical changes in volume when switching between sources.
- Settings are based on the volume level of the FM tuner, which remains unchanged.

1 Compare the FM tuner volume level with the level of the source you wish to adjust.

2 Press AUDIO to select SLA.
Press AUDIO until SLA appears in the display.

3 Press ▲ or ▼ to adjust the source volume.
Each press of ▲ or ▼ increases or decreases the source volume.
- SLA +4 – SLA –4 is displayed as the source volume is increased or decreased.

Notes
- Since the FM tuner volume is the control, it is not possible to apply source level adjustments to the FM tuner.
- The AM tuner volume level can also be adjusted with source level adjustments. ▣


Power amp
(sold separately)
Connecting cords
with RCA pin plugs
(sold separately)
System remote control
Blue/white
To system control terminal of the power amp
or Auto-antenna relay control terminal
(max. 300 mA 12 V DC).
Fuse
This Product
Antenna jack
Rear output
Yellow
To terminal always supplied
with power regardless of
ignition switch position.
Red
To electric terminal controlled
by ignition switch (12 V DC)
ON/OFF.
Black (ground)
To vehicle (metal) body.
With a 2 speaker system, do not connect
anything to the speaker leads that are not
connected to speakers.
Perform these connections when using a
different amp (sold separately).
Left
Right
Front speaker
Rear speaker
Front speaker
Rear speaker
Rear speaker
Rear speaker
White
White/black
Gray
Gray/black
Green
Green/black
Violet
Violet/black

8.2 SPECIFICATIONS

General

Power source ..... 14.4 V DC (10.8 – 15.1 V allowable)
Grounding system ..... Negative type
Max. current consumption ..... 10.0 A
Backup current..... 5 mA
Dimensions (W × H × D):
(DIN)
Chassis ..... 178 × 50 × 157 mm (7 × 2 × 6-1/8 in)
Nose ..... 188 × 58 × 19 mm (7-3/8 × 2-1/4 × 3/4 in)
(D)
Chassis ..... 178 × 50 × 162 mm (7 × 2 × 6-3/8 in)
Nose ..... 170 × 48 × 14 mm (7 × 1-7/8 × 1/2 in)
Weight ..... 1.5 kg (3.3 lbs)

Audio

Continuous power output is 20 W per channel min. into 4 ohms, both channel driven 50 to 15,000 Hz with no more than 5% THD.
Maximum power output 45 W × 4
Load impedance ..... 4 Ω (4 – 8 Ω allowable)
Preout max output level/output impedance ..... 2.2 V/1 kΩ
Equalizer (3-Band Equalizer):
(LOW) ..... Level : ±12 dB
(MID) ..... Level : ±12 dB
(HIGH) ..... Level : ±12 dB
Loudness contour
(LOW) ..... +3.5 dB (100 Hz), +3 dB (10 kHz)
(MID) ..... +10 dB (100 Hz), +6.5 dB (10 kHz)
(HIGH) ..... +11 dB (100 Hz), +11dB (10 kHz) (volume : –30 dB)

CD player

System ..... Compact disc audio system
Usable discs ..... Compact disc
Signal format:
Sampling frequency 44.1 kHz
Number of quantization bits ..... 16; linear
Frequency characteristics ..... 5 – 20,000 Hz (±1 dB)
Signal-to-noise ratio ..... 94 dB (1 kHz) (IHF-A network)
Dynamic range ..... 92 dB (1 kHz)
Number of channels ..... 2 (stereo)

FM tuner

Frequency range ..... 87.9 – 107.9 MHz
Usable sensitivity ..... 9 dBf (0.8 µV/75 Ω, mono, S/N: 30 dB)
50 dB quieting sensitivity 15 dBf (1.5 µV/75 Ω, mono)
Signal-to-noise ratio ..... 70 dB (IHF-A network)
Distortion ..... 0.3% (at 65 dBf, 1 kHz, stereo)
Frequency response ..... 30 – 15,000 Hz (±3 dB)
Stereo separation ..... 40 dB (at 65 dBf, 1 kHz)
Selectivity ..... 70 dB
Three-signal intermodulation (desired signal level) ..... 30 dBf (two undesired signal level: 100 dBf)

AM tuner

Frequency range ..... 530 – 1,710 kHz (10 kHz)
Usable sensitivity ..... 18 µV (S/N: 20 dB)
Selectivity ..... 50 dB (±10 kHz)

Note

- Specifications and the design are subject to possible modifications without notice due to improvements. ▣

Service Manual

ORDER NO.
CRT2624

CD MECHANISM MODULE

CX-977

- **This service manual describes the operation of the CD mechanism module incorporated in models listed in the table below.**
- **When performing repairs use this manual together with the specific manual for model under repair.**

Model	Service Manual	CD Mechanism Module
DEH-P630/X1N/UC	CRT2648	CXK5500
DEH-P7300R/X1N/EW	CRT2649	
DEH-P730/X1N/UC	CRT2650	
DEH-P7350/X1N/ES	CRT2651	

CONTENTS

PIONEER CORPORATION 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153-8654, Japan
PIONEER ELECTRONICS SERVICE INC. P.O.Box 1760, Long Beach, CA 90801-1760 U.S.A.
PIONEER EUROPE NV Haven 1087 Keetberglaan 1, 9120 Melsele, Belgium
PIONEER ELECTRONICS ASIACENTRE PTE.LTD. 253 Alexandra Road, #04-01, Singapore 159936

K-ZZA. MAR. 2001 Printed in Japan

1. CIRCUIT DESCRIPTIONS

From divisional viewpoint, the CX-977 is roughly divided into four sections, namely, Preamplifier, Servo, Power Supply and Loading Control.

This LSI realizes eight types of automatic adjustments (controls) through cooperative work between Preamplifier and Servo unit.

Because the system uses the single power source (+ 5v) specification, reference voltages used in the servo system (Preamplifier, Servo DSP and Pickup) are all Vref (2.1V).

1.1 PREAMPLIFIER (TA2153FN; IC101)

The Preamplifier processes output signals sent from the Pickup and generates signals to supply to each unit of the next stage, that is, Servo, Demodulator or Control. It also performs power control of Pickup's laser diode. Signals from the Pickup are I-V-converted by the Preamplifier, which is built-in in Pickup's photo detector, and then added-up by the RF amplifier to obtain signals such as RF, FE and TE.

Reference voltage, Vref (2.1v), is output from #19 pin of the IC, and 2Vref (4.2v) is supplied to the Servo DSP as the reference voltage to determine its D range of A/D input.

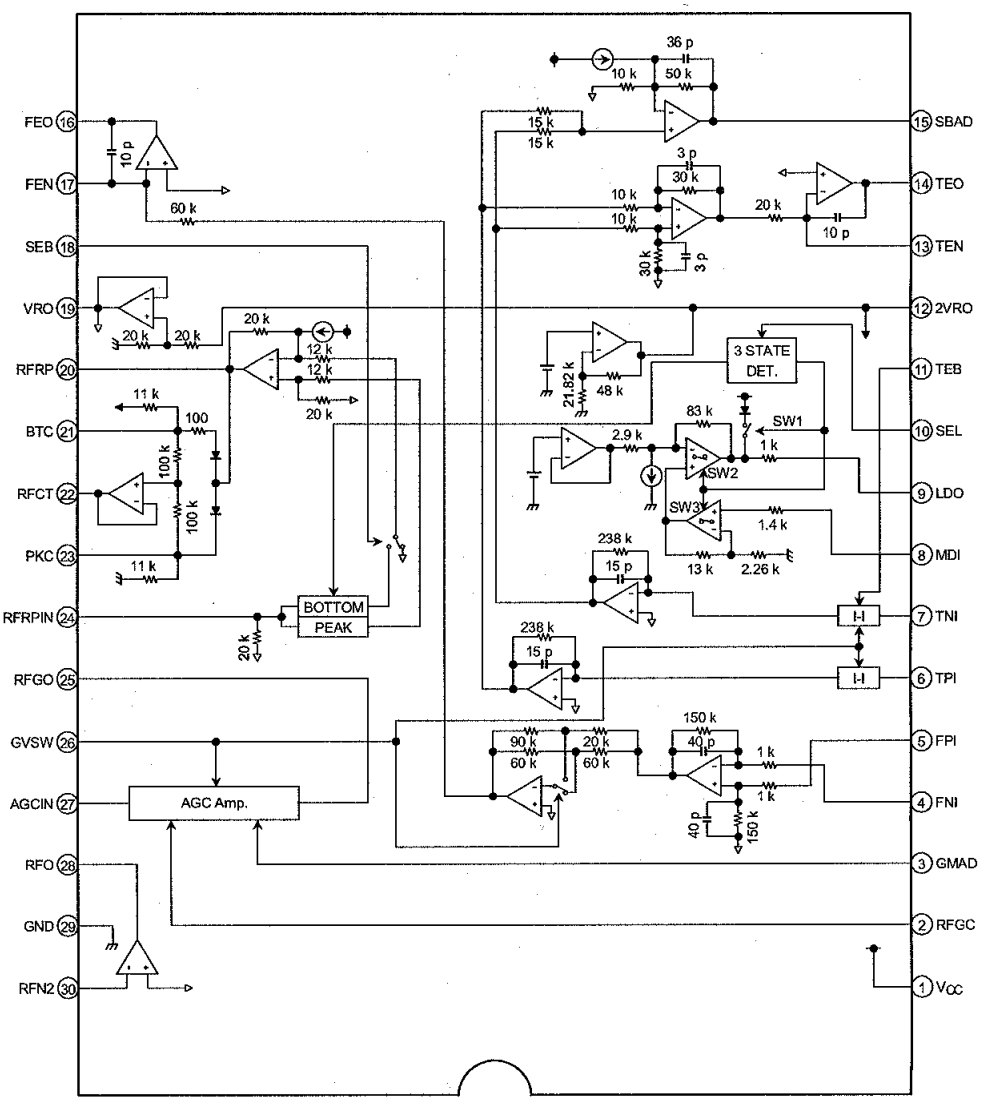


Fig. 1: TA2153FN circuit

1) Focus Error Amplifier unit

In this sub-unit, outputs from the photo detector, namely, (A+C) and (B+D), are processed in the differential amplifier and further in the error amplifier, and then, (A+C-B-D) is output as FE signal from #16 pin of IC101 (TA2153FN).

Low frequency component of voltage FE is expressed as:

FE = (A+C-B-D) x (150k/(51k+1k)) x (60k/60k) x (120k/60k) = 5.77 times

In FE output, "S" curve of approximately 1.45 Vpp on the basis of Vref is obtained. The cutoff frequency of the succeeding amplifier is 11.4 kHz.

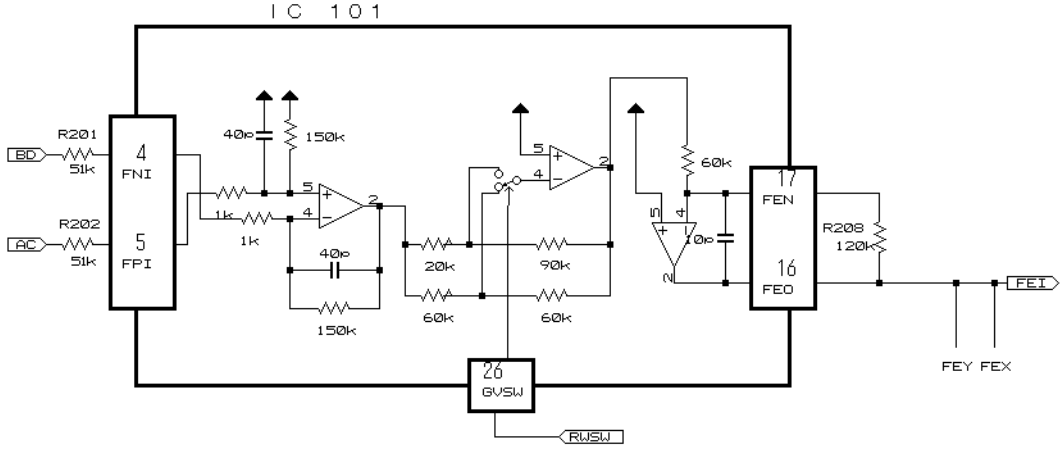


Fig. 2: FE circuit

2) Tracking Error Amplifier unit

In this sub-unit, outputs from the photo detector, namely, E and F, are processed in the differential amplifier and further in the error amplifier, and then, (E-F) is output as TE signal from #14 pin of IC101 (TA2153FN).

Low frequency component of voltage TE is expressed as:

TE = (E-F) x 300k/100k x 82k/20k = 5.8 times

In TE output, "TE" waveform of approximately 1.51 Vpp on the basis of Vref is obtained. The cutoff frequency of the succeeding amplifier is 20 kHz.

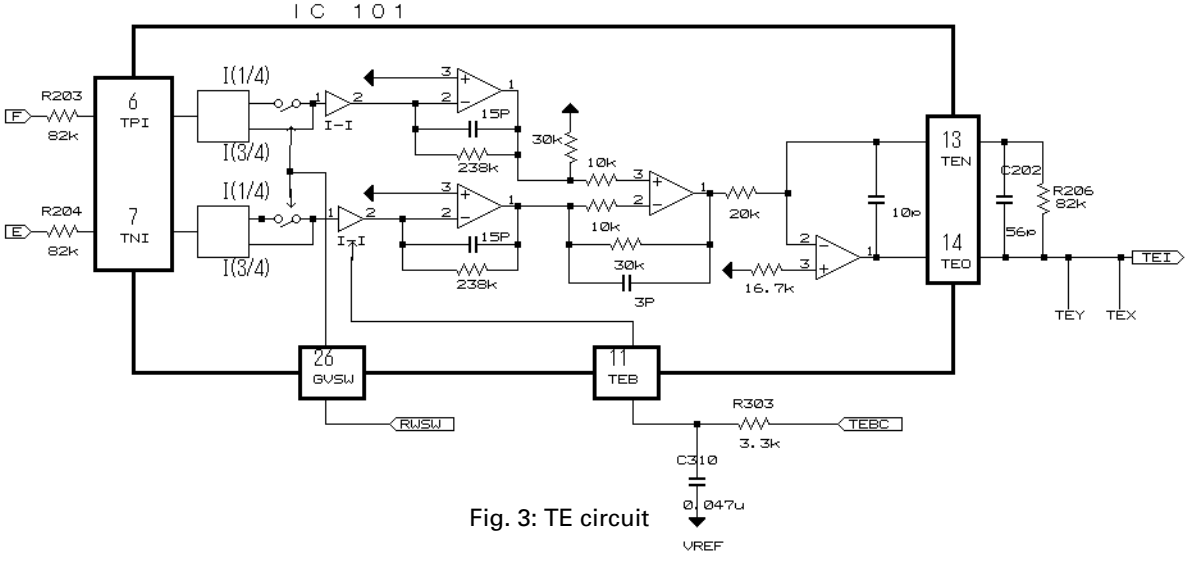


Fig. 3: TE circuit

3) RF Amplifier unit

Outputs from the photo detector, namely, (A+C) and (B+D), are added up, amplified and equalized in the Head Amplifier LSI (TA2153FN). The processed-signals are output to RFI terminal as RF signals (These signals are used to check eye patterns).

Low frequency component of voltage RFI is expressed as:

RFI = (A+B+C+D) x 5.43

RFI is used for RF Offset Control circuit. These RFI signals so output from #28 pin are AC-coupled outside the unit, and then re-input to #27 pin and amplified by the RFAGC amplifier to obtain RFO signals.

TA2153FN has built-in function for RFAGC adjustment, as described later, and through such function, the gain of RFAGC is controlled so that RFO output stays within 1.2 ± 0.3 Vpp range.

Also, RFO signals are used for EFM and RFAGC Adjustment circuit. They are further used to generate RFRP and RFCT signals, both of which are used for track counting.

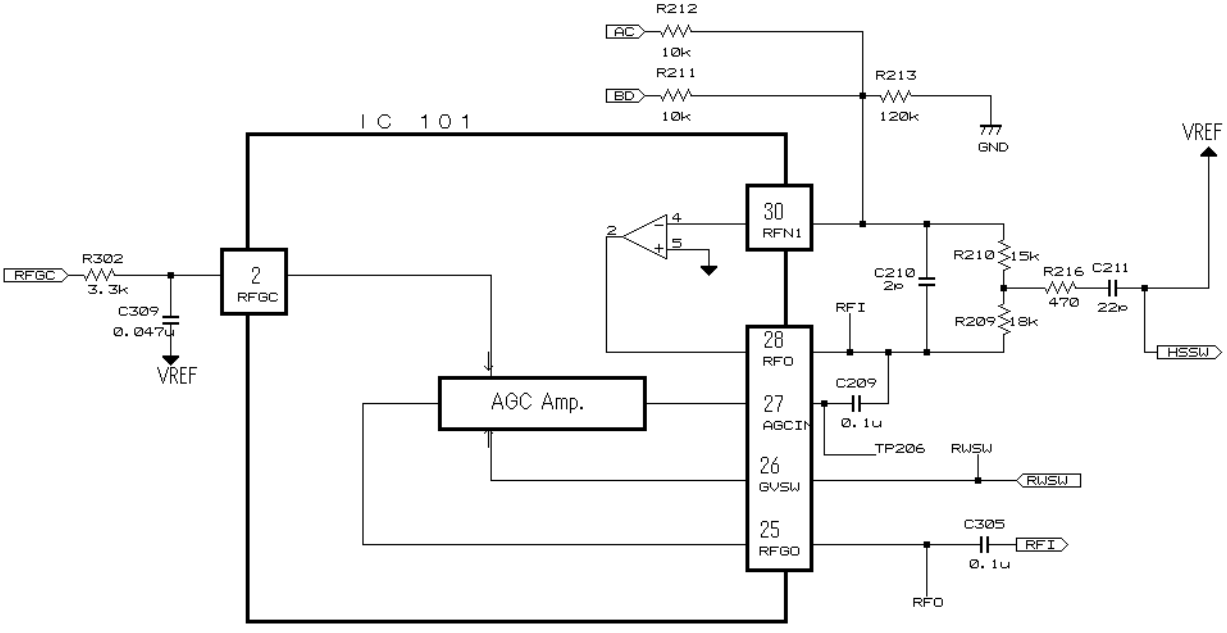


Fig. 4: RF circuit

4) RFRP and RFCT Signal Circuit unit

RFCT signals are generated through the Head Amplifier (IC101). A RFCT signal is the difference signal that represents the difference between the peak and bottom level of RF signal. RFRP and RFCT can be monitored at TP203 (#20 pin of IC101, namely, TA2153FN) and TP204 (#20 pin of IC101) respectively.

Size-comparison among TE, RFRP and RFCT signals is performed by the Hysteresis Comparator in IC201 (TC9495F2), and through such comparison, track information (TEZC and RFZC signal) is generated. Based on these signals, information to determine tracking speed of the lens when it moves on the disk is generated. Also based on these signals, number of tracks is counted.

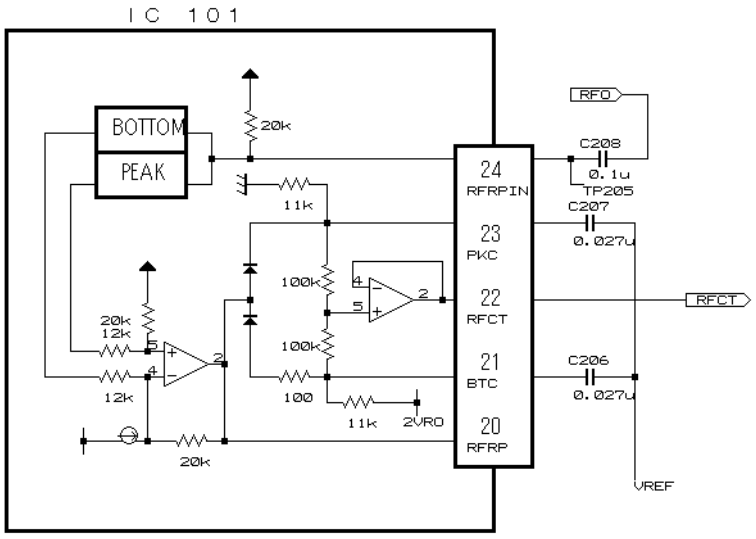


Fig. 5: RFRP and RFCT circuit

5) SBAD Signal Circuit unit

In this unit, outputs from the photo detector, namely, E and F are processed through the addition amplifier. That is, E and F are added together and (E+F) signal is output from #15 pin of IC101 (TA2153FN), as SBAD signal.

This SBAD signal, along with Focus Error signal, is used as one of the conditions that the system uses to internally judge Focus ON/OFF based on them.

Also, SBAD signal is used to detect defects: defects that may be detected when the Pickup passes a scratch on the disk, for instance.

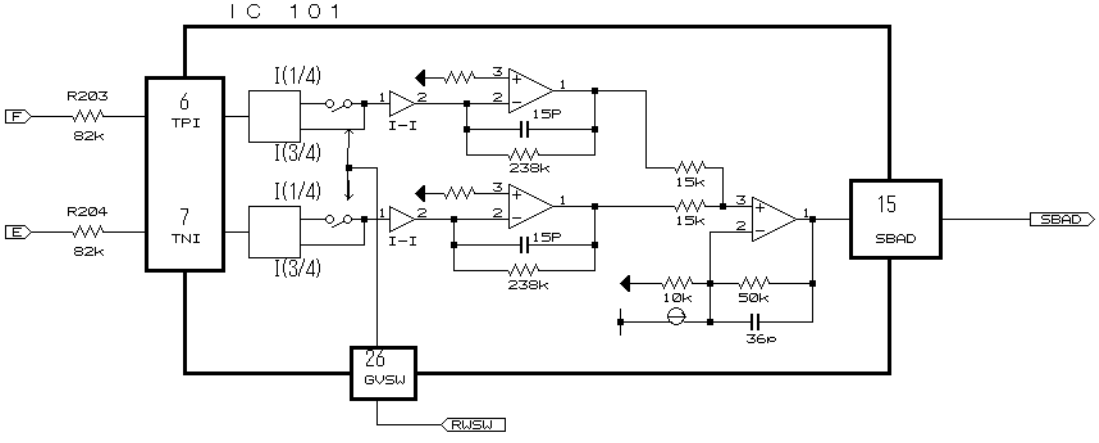


Fig. 6: SBAD circuit

6) APC Circuit unit

If a laser diode is driven at constant current, its optical output comes to have high level negative-characteristics, and this may cause it out-of-control drive because of the heat. So, driving current must be controlled, through use of a monitoring diode, so that optical output remains within the specific degree. This is exactly where APC circuit works. LD current can be obtained by measuring the voltage between LD1 and GND. The value is approximately 35 mA at room temperature.

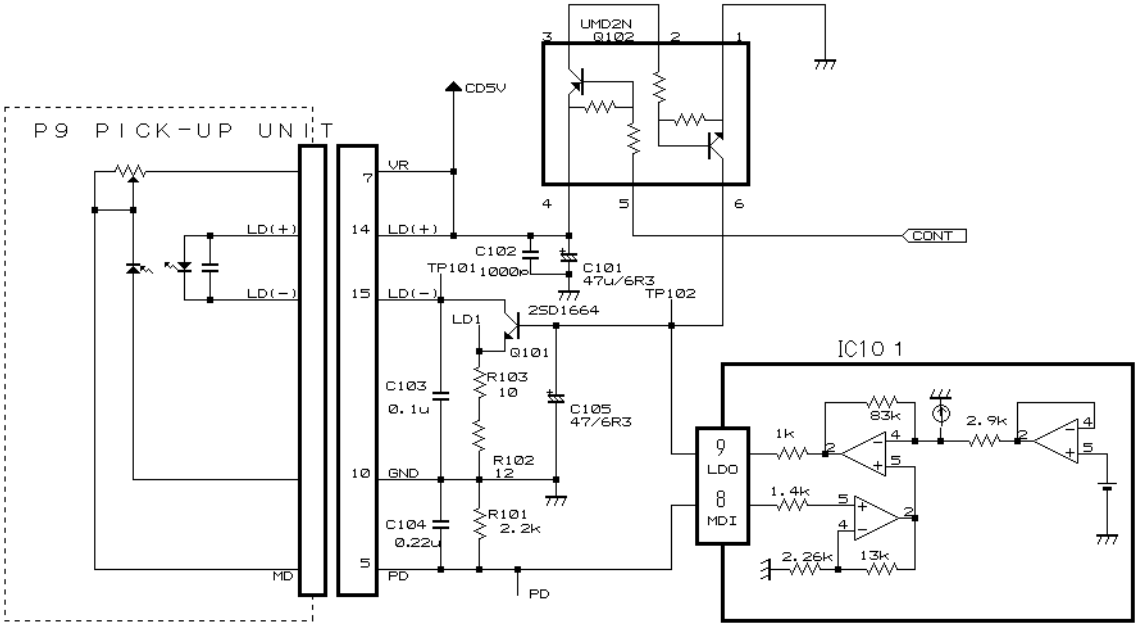


Fig. 7: APC circuit

1.2 SERVO DSP (TC9495F2; IC201)

1) Focus Servo system

The main equalizer of the Tracking Servo is comprised with a digital equalizer unit. Fig. 8 shows the block diagram of the Tracking Servo.

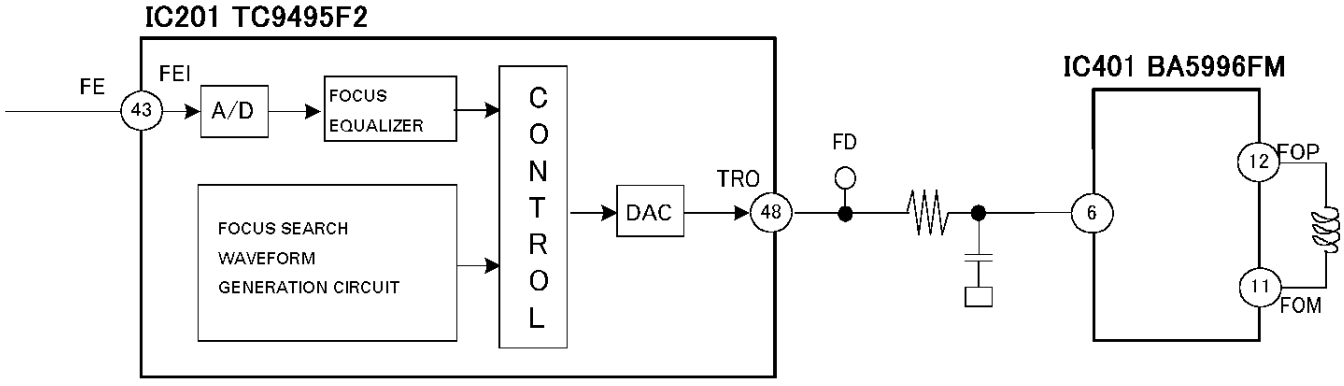


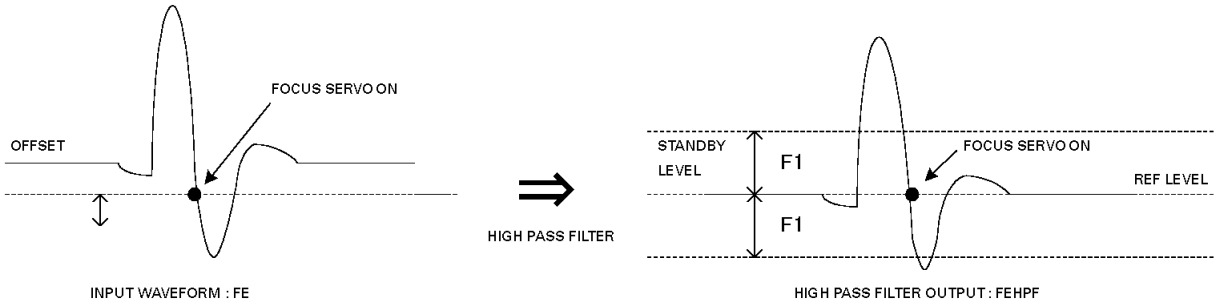
Fig. 8: Block diagram of Focus Servo circuit

A series of actions of detecting in-focus point and switching on the Focus Servo upon such detection are called "focus search." In Focus Servo system, the system needs to move the lens to in-focus point so that it performs "Focus Close." So, the system detects in-focus point moving the lens up and down, which it performs by changing focus search voltage of a triangle wave. During these operations, the spindle motor maintains offset mode and keeps constant rotating speed.

The Focus Servo is switched on through three steps shown below.
1. FOK=H
2. The Focus Error signal exceeds "Focus Standby" level threshold
3. The Focus Error signal reaches "Zero Cross"

Here are descriptions of the three steps.
While there is enough distance between the lens and the in-focus point, the system cancels SBAD offset, and defines this level (distance) as SBOFF. Then, starting from this SBOFF standard, SBAD level moves toward FOK threshold, reaches it, and finally exceeds the threshold. Upon this passing over the threshold, the condition of the lens becomes FOK ="H."

As the lens moves up and down, the focus error signal changes at the in-focus point. CD-LSI (IC201) analog/digital-converts such signal, and then, let the signal pass through the high-pass filter to remove the offset component of the signal. The signal so processed is called FEHPF signal. When the level of the FEHPF signal (internal signal of the LSI) exceeds "Focus Standby" level, because it means the lens has come to close to the in-focus point, the system sets the condition of the lens to "Servo-ON Standby." Finally, the FEHPF signal matches the value of the in-focus point, and the system triggers ON of the Focus Servo.



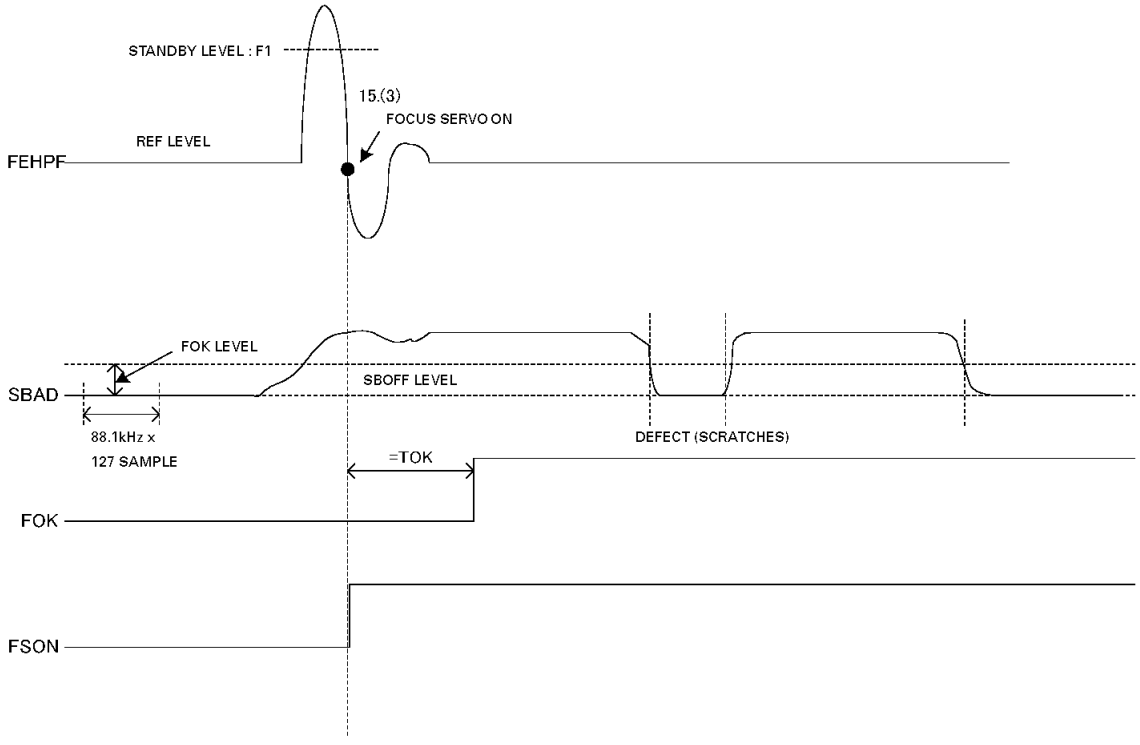


Fig. 9: Focus Search Timing

The microcomputer monitors FOON signal while the system is performing focus search, and starts monitoring of FOK signal from the point when 40 ms has passed after FOON signal became active (The signal is active when the condition is "Servo ON." It shows "L" in a test with a probe). If the microcomputer judges that FOK is not active, it performs necessary actions such as protection.

When, under Test mode, you press the Focus Close button, with the "Mode Select" of the focus set to "Display 01," you can check Focus Error signals, search-voltage and actual actions of the lens.

2) Tracking Servo system

The main equalizer of the Tracking Servo is comprised with a digital equalizer unit. Fig. 10 shows the block diagram of the Tracking Servo.

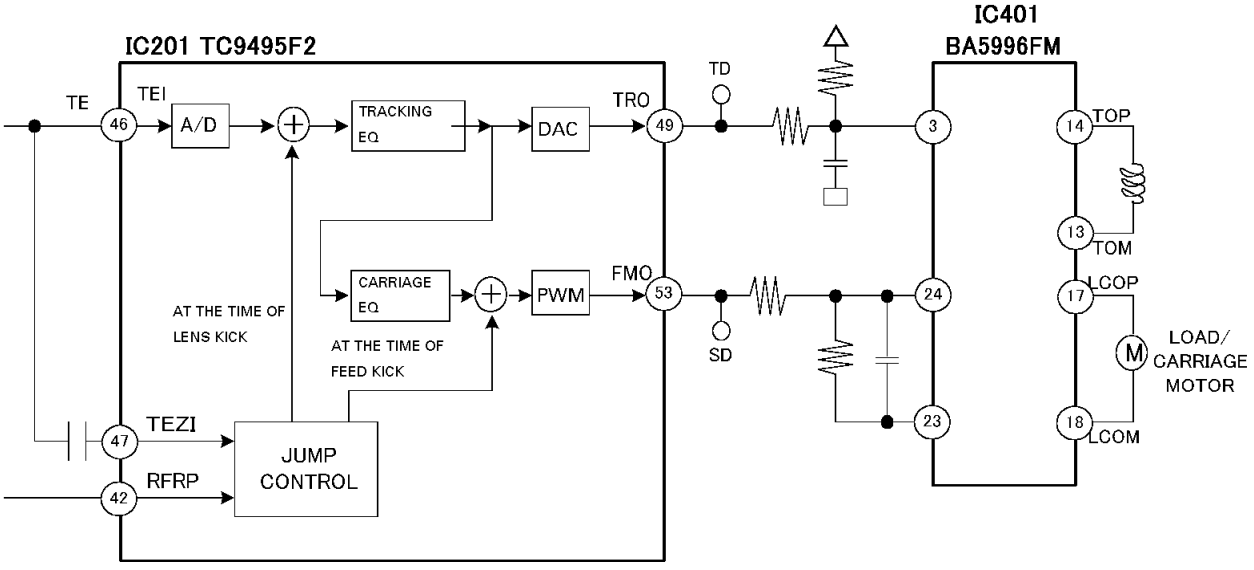


Fig. 10: Block diagram of the Tracking Servo

Track jump

Track jump is automatically performed with a command issued by the microcomputer. It is performed through Auto-Sequence function that the LSI has in it.

The CX-977 has two types of track jump as those used for searching. Namely, the "Lens Kick" mode used for 1, 4, 10, 32 and 100 track, and the "Carriage Move" mode used for jumping of more than 1,000 tracks. Under Test mode, you can use, to check the track position, 1, 32 and 100 jump as Lens Kick jump and Carriage Move jump according to mode selection.

• Lens Kick jump

A Lens Kick jump is performed when the LSI receives a Lens Kick command from the microcomputer. Direction of jump and number of tracks are specified by the command. When the LSI receives a Lens Kick command, it applies kick pulses to the tracking EQ, and the jump occurs.

The LSI controls travelling speed of the lens by referring to the table it holds in it. In such way, the lens travels faster when there are a good number of tracks to go, while travelling speed gets slower as the number of remaining tracks decreases.

When track count is completed, Tracking Close is performed. During jump, the LSI observes RFRP signals, and based on the signals, performs track count. It detects the direction of the jump based on phases of RFRP and TEZI signals.

To prepare for good servo-feed in next time track jump, the system performs operations to increase Tracking Servo's gain and hysteresis operations for 50 ms after completion of Tracking Close. The system realizes FF/REV actions under Normal mode by continuously performing single jumps. The speed of FF/REV is approximately 10 to 20 times faster than "Play" (varies depending on the direction).

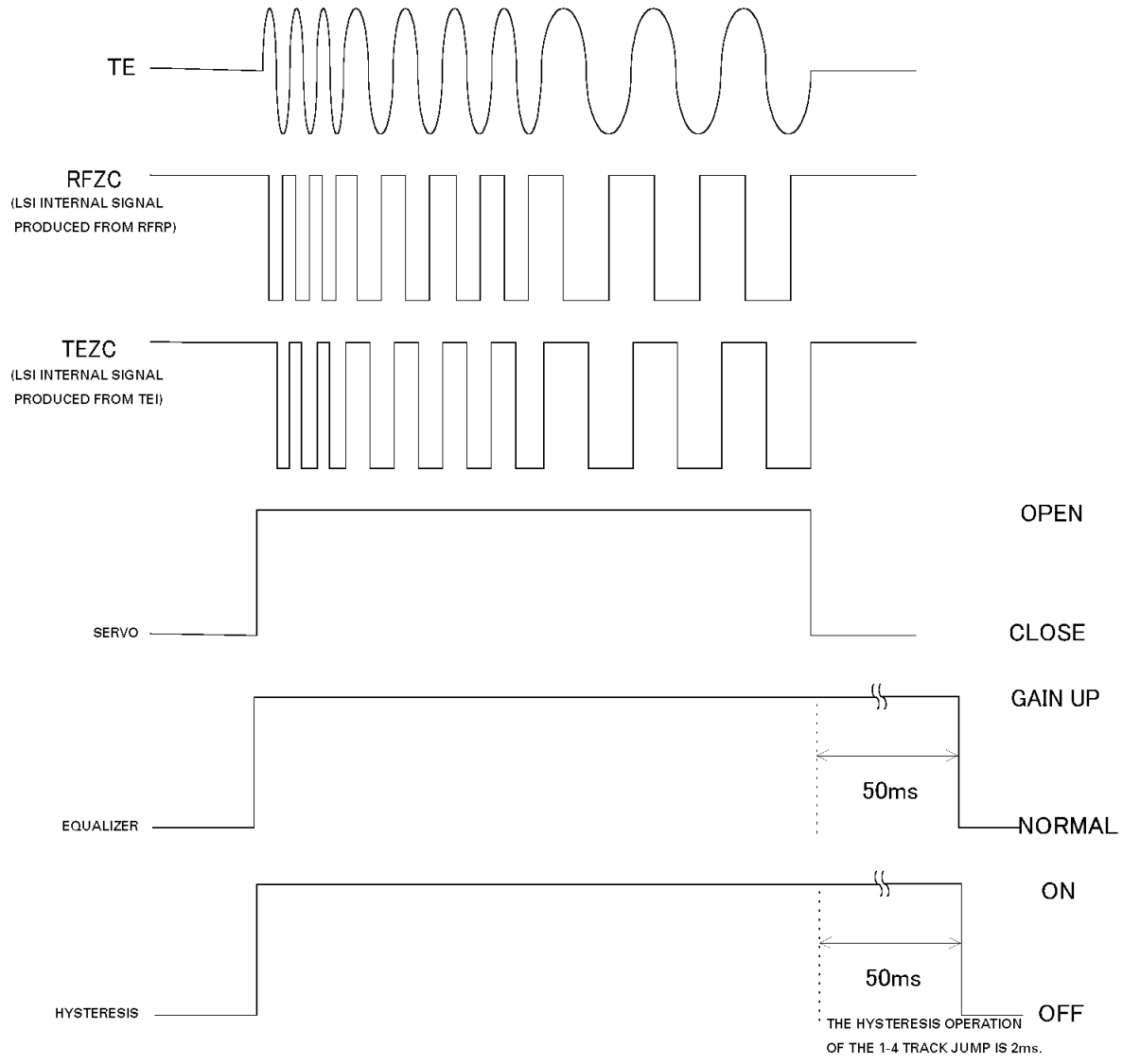


Fig. 11: Lens Kick

• Carriage Move jump

A Carriage Move jump is performed when the LSI receives a Carriage Move command from the microcomputer. Direction of move and number of tracks are specified by the command. When the LSI receives a Carriage Move command, it makes the Tracking Servo "Open," applies kick signals to the Carriage EQ and make the carriage motor drive. Thus, a track jump occurs.

The profile of the kick signals so applied to the EQ has the specific constant given to it at the starting-up of the jump operations. So, as the number of remaining tracks decreases, voltage is lowered so that travelling speed of the carriage becomes slower. In this way, by reducing speed just before the jump terminates, the servo-feed at the end of the jump is improved.

Also, to prepare for good servo-feed in next time track jump, every time a jump is completed, the system performs operations to increase the gain of the Tracking Servo and hysteresis operations for 60 ms after the completion of the jump.

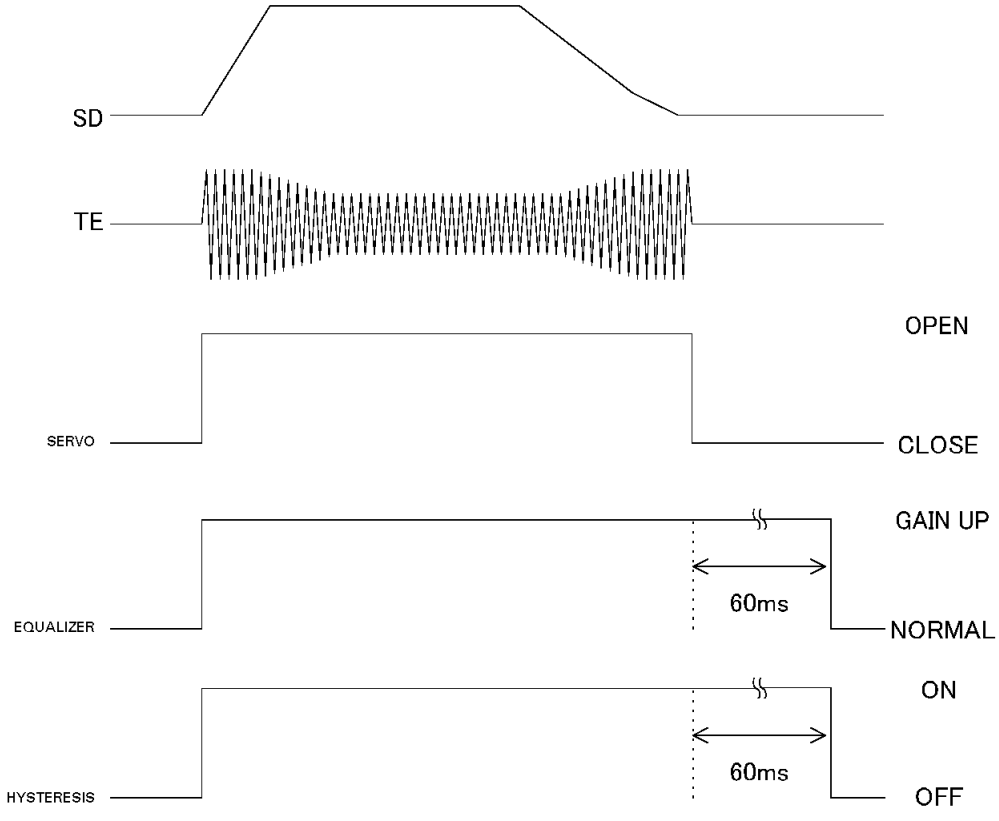


Fig. 12: Carriage Move

• Hysteresis operations

In certain operation, such as Setup or jump, servo-feed tends to be deteriorated during operations. Hysteresis is the operation to keep stable feed to servo-loop under such conditions. It acts in such manner that it holds a TE signal when each beam spot comes to off-track position, so that convergence of the Tracking Servo can be improved.

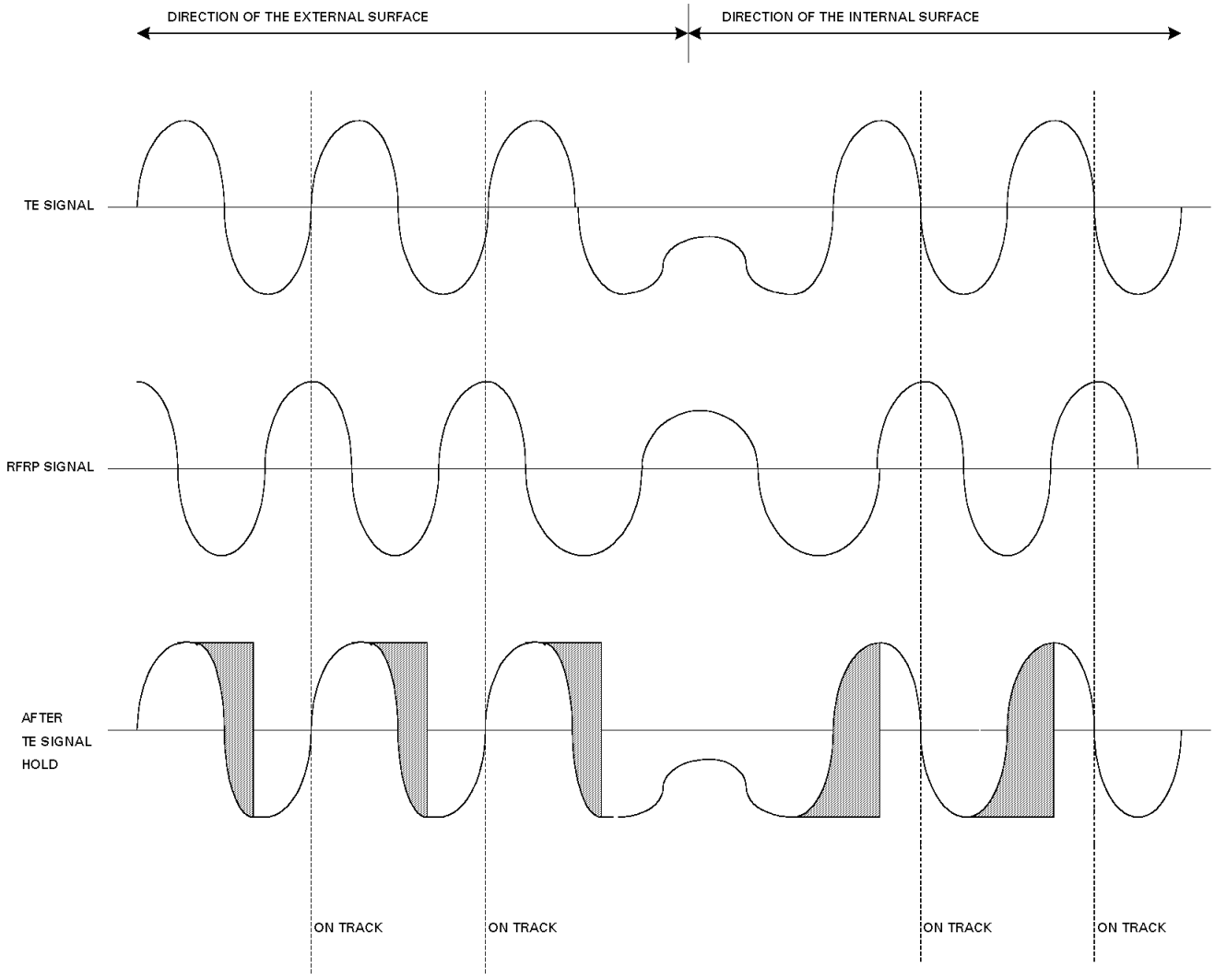


Fig. 13: Hysteresis operations

3) Carriage Servo system

The Carriage Servo inputs low-frequency-component output (lens position information) of the tracking equalizer into the carriage equalizer, then, after it has earned certain amount of gain, it outputs a drive signals from the LSI. Further, such drive signals are applied to the carriage motor via the driver.

Specifically, the system works as follows. That is, entire body of the pickup needs to move to the forward direction when the lens offset reaches certain level during Play. So, the gain of the equalizer is set in such manner that the equalizer constantly outputs higher voltage than the starting-up voltage of the carriage motor when such condition occurs. Practically, the system satisfies such requirement in such manner that the Servo LSI outputs the drive voltage only when the equalizer's output exceeds the specific level of threshold.

To minimize power consumption, and to stabilize operations, the level of threshold is pre-set slightly higher than the starting-up voltage of the motor. Waveforms of output of this drive voltage take pulse shape.

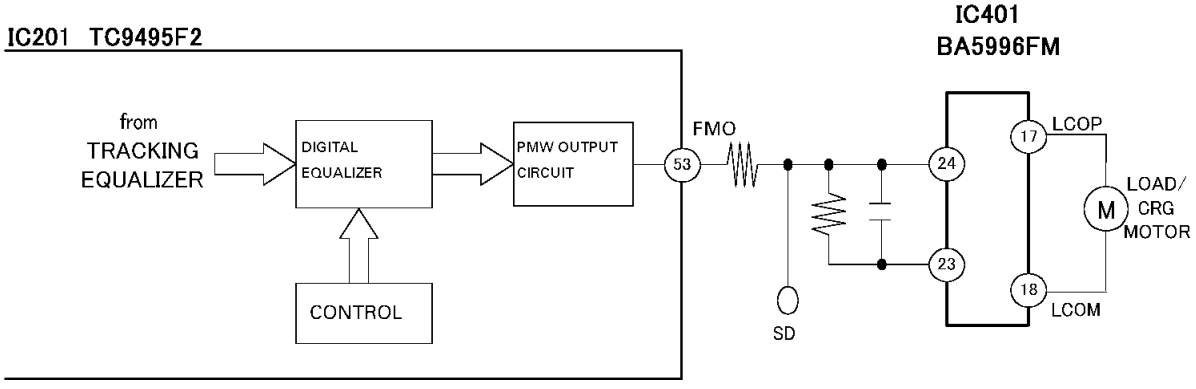


Fig. 14: Block diagram of Carriage Servo circuit

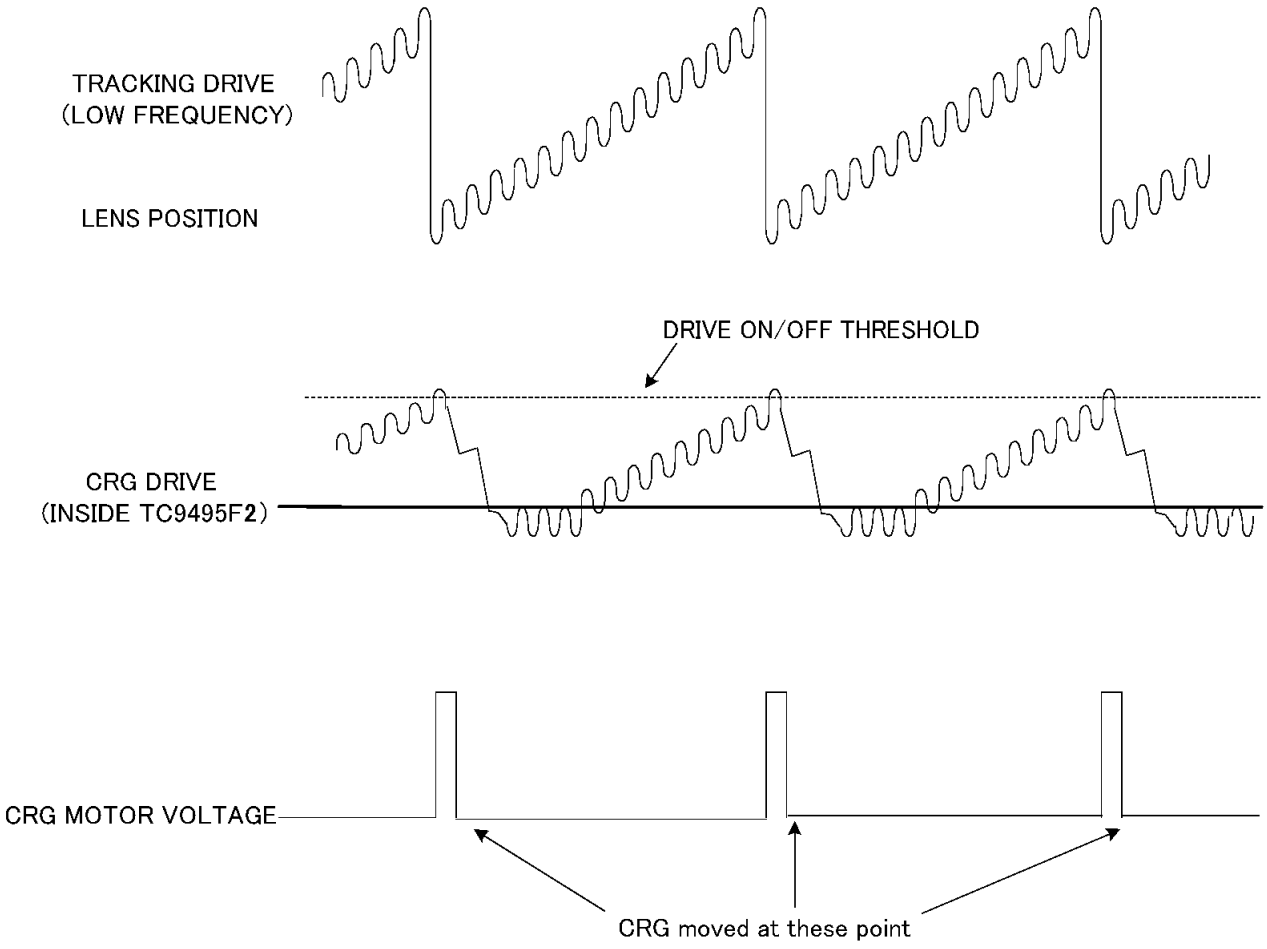


Fig. 15: Carriage signal waveform

4) Spindle Servo system

Fig.16 shows the block diagram of the Spindle Servo.

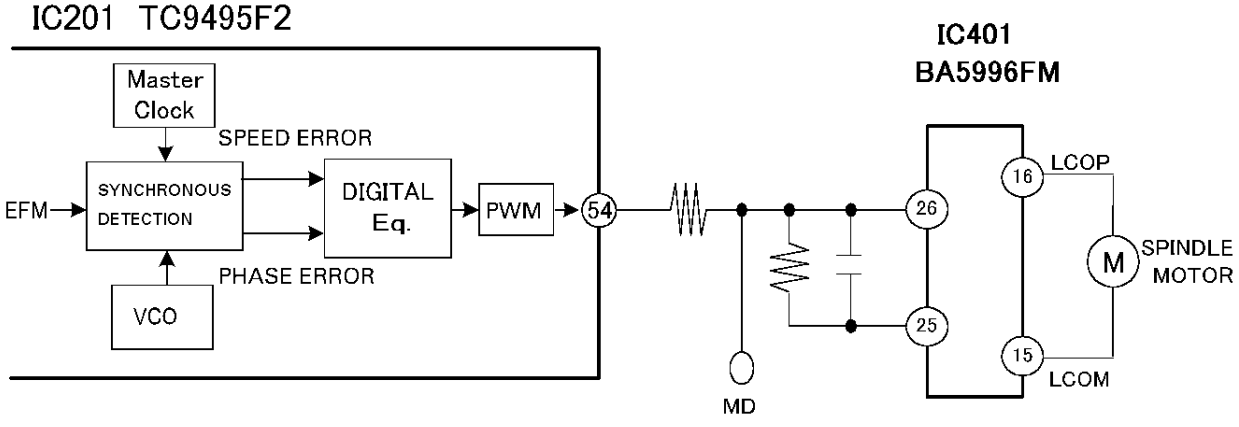


Fig. 16: Block diagram of the Spindle Servo circuit

Spindle Servo has the following modes

• CLV Servo mode
This is the mode the system uses for such span as "after Focus Close and before it applies brake to the motor to stop the disk." Before Tracking Close and during normal Play, the system operates under this mode.

During this mode, the system performs synchronous detection in EFM demodulation block in the CD-LSI (IC201) so that the disk keeps predefined rotating speed. To realize synchronous detection before Tracking Close the system adopts such method that it applies to PLL circuit the same speed control by VCO that is performed in the LSI.
On the other hand, as to speed control after Tracking Close, control by VCO is muted and the method is switched to speed/phase control through the master clock (a ceramic oscillator).

• Offset Servo mode
(a) After the kick is over in the setup, this mode is turned on until changing to rough servo mode.
(b) When focus is lost during play, this mode is turned on until the focus is restored.
Both of the above are used for maintaining the disc rotation rate near to the specified rate.

• Brake mode
The mode is for use to stop the spindle motor.
Brake Sequence starts up when the microcomputer sends the command to CD-LSI. Then, the LSI, watching disk's rotating speed, sets the flag when it detects that the speed comes to approximately one twentieth (1/20). On the other hand, the microcomputer, also monitoring such flag, switches off the servo when it caches the flag.

In case the microcomputer cannot catch such flag within the specific period after starting-up of the Brake Sequence, it changes the mode to Stop, and monitoring FG pulses, keep the mode until it confirms that the speed has become slow.

In case such change to Stop mode occurs at Eject time, the microcomputer moves the operations to Eject operations after Timeout time elapses.

• Stop mode
This is the mode used for Power-On and Eject operations. Drive's output is "0."

1.3 AUTOMATIC ADJUSTMENT FUNCTION

In this CX-977 system, all circuit adjustments are automatically performed in CD-LSI (IC201: TC9495F2). Adjustments are automatically performed every time a disk is inserted into the unit, or a CD mode is selected through the Source Key.

1) Automatic TE offset/FE offset adjustment

This is the adjustment performed at POWER ON time. It adjusts both TE and FE amp- offsets of the Preamplifier to the target value defined for each signal (TE and FE), using Vref as the reference. The target values are (TE, FE) = (0, 0) [V]

Adjustments are performed as follows.
(1) Servo LSI reads each offset value under the condition of "Laser Diode is OFF."
(2) The LSI, based on the value so read, calculates the voltage to be reversed, and assigns the revised value to the location specified for use for such adjustment.

If you want to observe changes of voltage to examine actual offset voltage shown as error (focus error or tracking error), you cannot see such changes, even after adjustment, because such adjustment is made inside the digital filter.

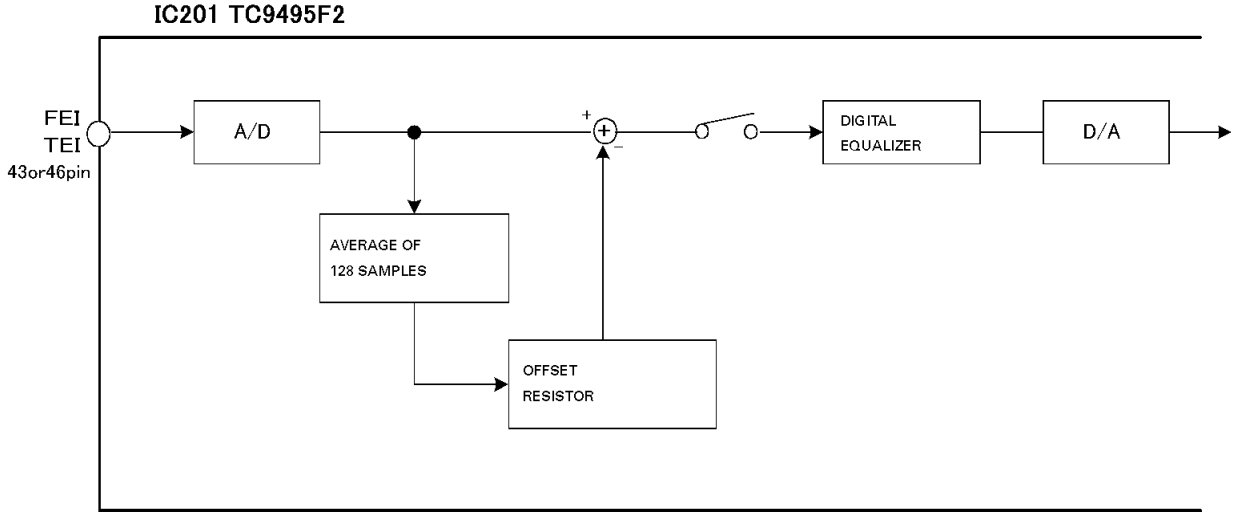


Fig. 17: Offset adjustment

2) Automatic Tracking Balance (T, BAL) adjustment

This is the control that eliminates the difference between pickup's Ech and Fch output by changing the gain in the Preamplifier. In practice, the LSI realizes the control in such manner that it makes a TE waveform vertically symmetric against the Servo Reference level.

Adjustments are performed as follows.
(1) After Focus Close
(2) The system switches on the spindle servo.
(3) The LSI fetches the level of TE signal and the level of TE offset, and based on these values, calculates the TE center value.
(4) The LSI changes RF amp's gain so that such center value comes to close to the Servo Reference level.

Servo Reference level is set as follows.
In case offset adjustment is made, the level is set to:
The level of TEI input (i.e. TF offset level) at "Servo = OFF."
In case offset adjustment is not made, the level is equal to:
Vref level.
In this case, the adjustment is repeated several times to improve adjustment accuracy.

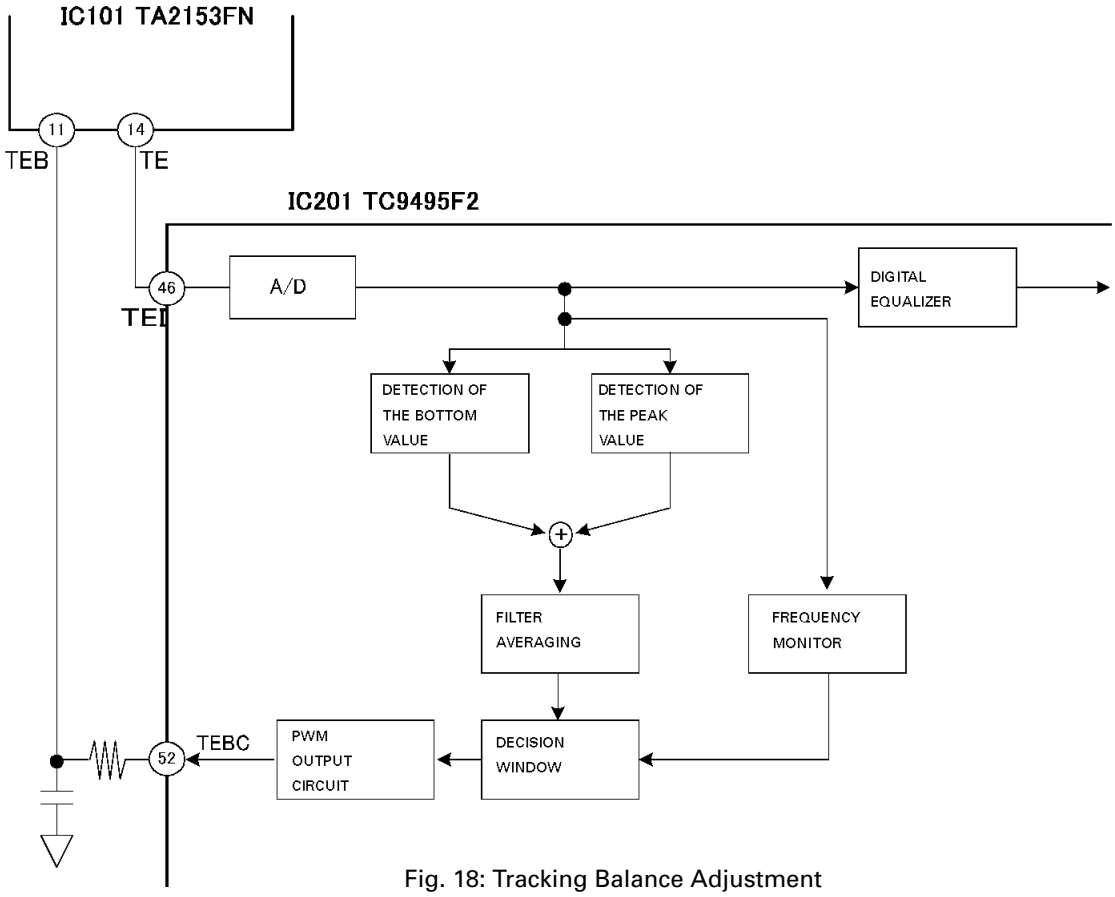


Fig. 18: Tracking Balance Adjustment

3) Focus/Tracking AGC

This is the control that automatically adjusts servo loop gain of the Focus Servo and Tracking Servo.
The adjustment is performed in the following manner.

(1) The system (microcomputer) injects a disturbance into servo loop.
(2) Then, caused by such injection, error signals (FE and TE) are generated, and the system samples such error signals through BPF.
(3) Then, inside the LSI, comparison of the difference of phase between the error signal and the disturbance is performed.
(4) Finally, the system adjusts the gain so that the difference of phase accords to the target value preset by the microcomputer.

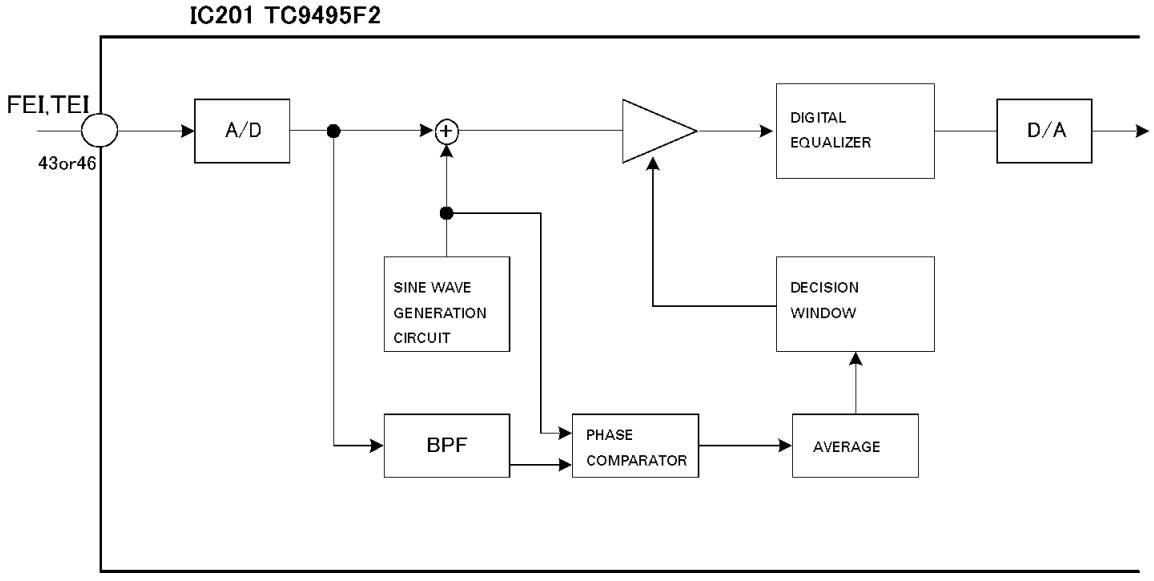


Fig. 19: Loop gain adjustment

4) FE Bias automatic adjustment

The task of this adjustment is to maximize RFI level by optimizing the focus point during Play. The adjustment is performed by examining RFRP level and phase-difference as of the time when a disturbance to generate focus errors is injected into focus loop.
Steps of the adjustment are shown below.

(1) A disturbance is injected into focus loop based on the command issued by the microcomputer. (The session is performed in the Servo LSI.)
(2) In the LSI, level of RFRP signal is detected.
(3) Also in the LSI, the relation between such RFRP signal and the disturbance is examined, and through such examination the degree and direction of focus misalignment is detected.
(4) Then, the system substitutes the detected-result for the value in the "Bias Adjustment" item (field).

As to this FE Bias automatic adjustment, as similar to cases of automatic gain control, the system repeats a series of adjustments several times to maximize accuracy of adjustments.

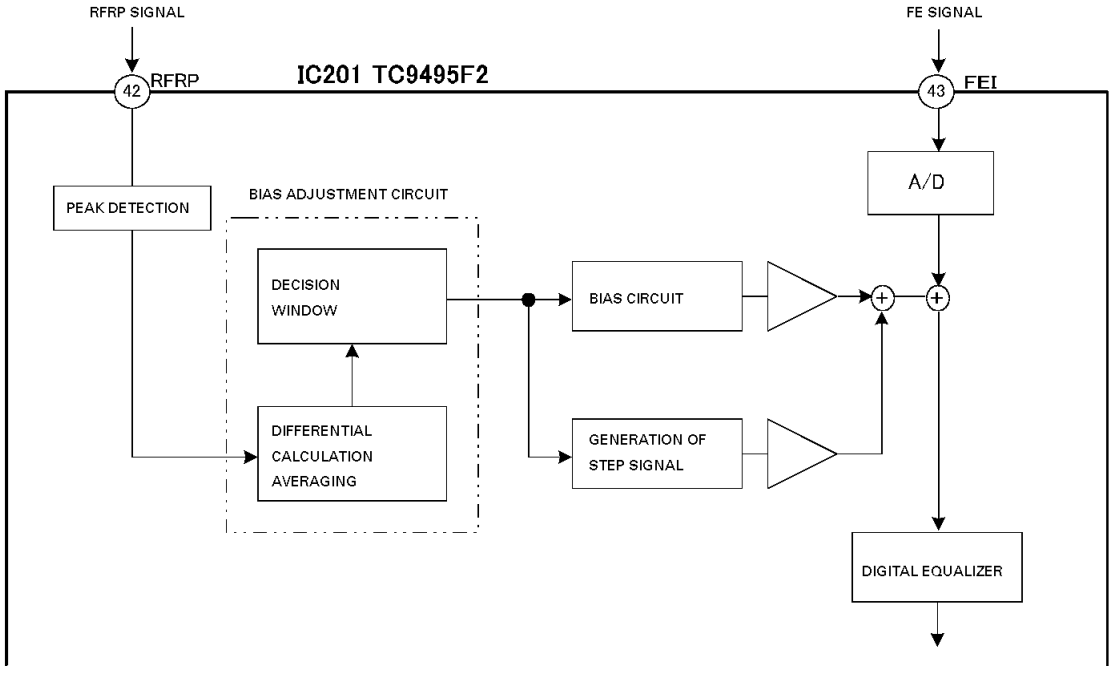


Fig. 20: FE Bias adjustment

5) RF Level automatic adjustment (RFAGC)

The aim of this adjustment is to adjust the variance of signals' level (RFO signals), which may be caused by mechanical factors or those factors derived from the disk, and keeps such variant levels to the specific value so that stable and accurate signal transfer can be secured. The adjustment is realized by varying amplifier-gains between RFI and RFO.

The following steps are taken.

(1) Based on the peak and bottom value of RFRP level inside the Servo LSI, RFRP 's PP level is calculated.

(2) The system compares this PP level with the standard level and catches the difference between the two. Then, based on this difference, it sets such amount of amplifier-gain, inside the LSI, as it needs to accord RFO signals with the target RFO level, so that RF amp's gain can be controlled.

These adjustments are performed in the following timing.
Just before the completion of Setup (i.e. just before "Play")
After restoration of correct focus, in case focus point comes to out of focus.

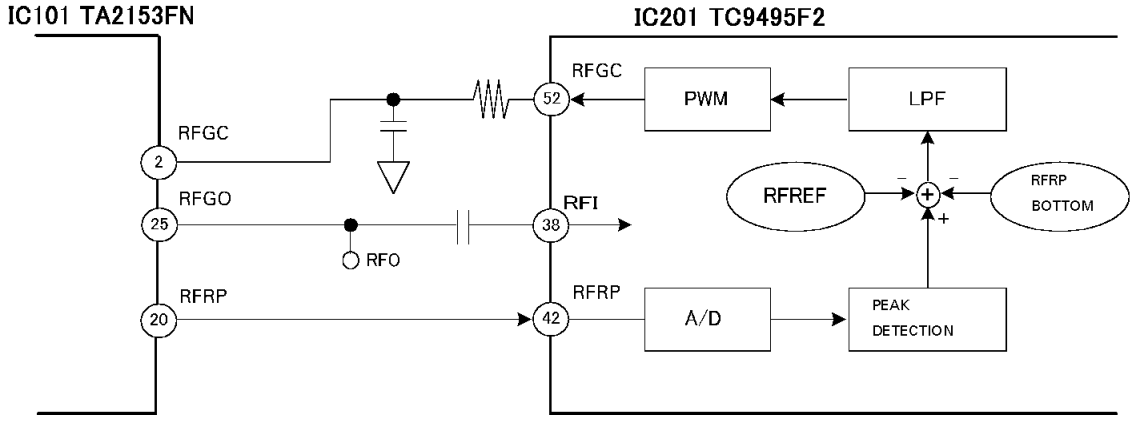


Fig. 21: RF level adjustment

6) Gain adjustment at Preamplifier-Stage

This adjustment increases the gain of entire RFAMP (FE, TE and RE amp.) by +13 dB through the specific setting on GVSW terminal. The adjustment occurs in such occasion that the lens is stained, or there is remarkably little reflection (light), during CD-RW replay operations, for instance.

The adjustment is performed as follows.
During Setup operations, if the system judges that there is remarkably little reflection of the disk, it switches the value of GVSW terminal from "H" to "L." Then, the gain of entire RFAMP increases by 13 dB.

For reference, if the system so changes the gain, it performs Setup operations over again form the beginning.

7) Comments for initial values of the foregoing adjustments

In principle, every and each automatic adjustment uses previous adjustment-value as the initial value unless microcomputer's power is switched off (That is, unless backup power is switched off.) (There are several exceptions.) In case backup power is switched off, or the value of CVSW terminal is "L," default initial value is used instead of such previous adjustment-value.

8) Function to display coefficient of the adjustment-result

In some automatic adjustments (FE Offset/TE Offset, Tracking Balance, Focus/Tracking AGC, FE Bias and RF AGC) you can display the result of the adjustment, that is, display the coefficient, under Test mode, to confirm the result. Below, details of coefficient-display function for each automatic adjustment are shown.

(1) FE Offset/TE Offset adjustment

Standard value = 32 (Value "32" indicates that no adjustment was required, and this value-definition applies to every case described in this section.) The unit of value representation of coefficient is 46 mV.

Example: Coefficient of FE offset = 35

35 - 32 = 3 3 x 46 mV = 138 mV

This means, that FE offset before the adjustment was 138 mV.

(2) T. BAL (Tracking Balance) adjustment
Standard value = 32
Coefficient = 33 to 63 ------ TE: Top side - Bottom side < 0
Coefficient = 31 to 0 ------ TE: Top side - Bottom side >0
Every time the value moves by "1" misalignment changes by approximately 0.71 to 4.97 %.
Maximum misalignment of minus side (<0) = When coefficient is 63
This is the misalignment of [TYP - 45 %].
Maximum misalignment of plus side (>0) = When coefficient is 0
This is the misalignment of [TYP + 45 %].

(3) Focus/Tracking AGC adjustment
Standard value: Focus/Tracking = 32 The unit of value representation of coefficient is approximately 0.375 dB.
Example: Coefficient of AGC = 48
48 - 32 = 16 16 x 0.375 dB = 6 dB
The meaning is, the system performed adjustment of "+6 dB" (i.e. 2 times).
In other words, servo-loop's gain before adjustment was "1/2 times" (a half) so the system doubled the entire gain to obtain the target value.

4) FE Bias adjustment
Standard value = 32 The unit of value representation of coefficient is approximately 21.5 mV.
Example: Coefficient of FE Bias = 35
35 - 32 = 3 3 x 21.5 mV = 64.5 mV
Thus, you can see that misalignment of FE Bias before the adjustment was "+ 64.5 mV."

5) RF Level adjustment (RFAGC)
Standard value = 32
Coefficient = 33 to 63 ..... Adjustment of level-variance is being made to the direction of raising RF level (Direction of increasing gain)
Coefficient = 31 to 0 ..... Adjustment of level-variance is being made to the direction of lowering RF level (Direction of decreasing gain)
Every time the value move by "1" gain changes by approximately 0.07 to 0.15 dB.
Maximum gain = When coefficient is 63
This is the gain of [TYP - 2.69 dB].
Minimum gain = When coefficient is 0
This is the gain of [TYP - 3.93 dB].

1.4 POWER SUPPLY AND LOADING CONTROL SECTION

CX-977 uses power sources of two systems. One is the VD (8.3 ± 0.5V) supplied by the motherboard. This system of power source ("Drive system" power source) is supplied to the 4-CH CD Driver IC and the 5V Regulator IC. The second is V+5 power source ("Control system" power source).

ON/OFF switching of the CD driver, except those for Load and Eject, is controlled by the microcomputer through "CONT" control terminal. ON/OFF switching of 5V is controlled through "CD5VON" control terminal. As to ON/OFF switches of the loading drive (Load/Eject), there is no control terminal specifically provided for such use. However, "LOEJ," which is an input signal, performs similar task. Also, at LCO Output part, switching of LOADING and CARRIAGE mode is performed through "CLCONT."

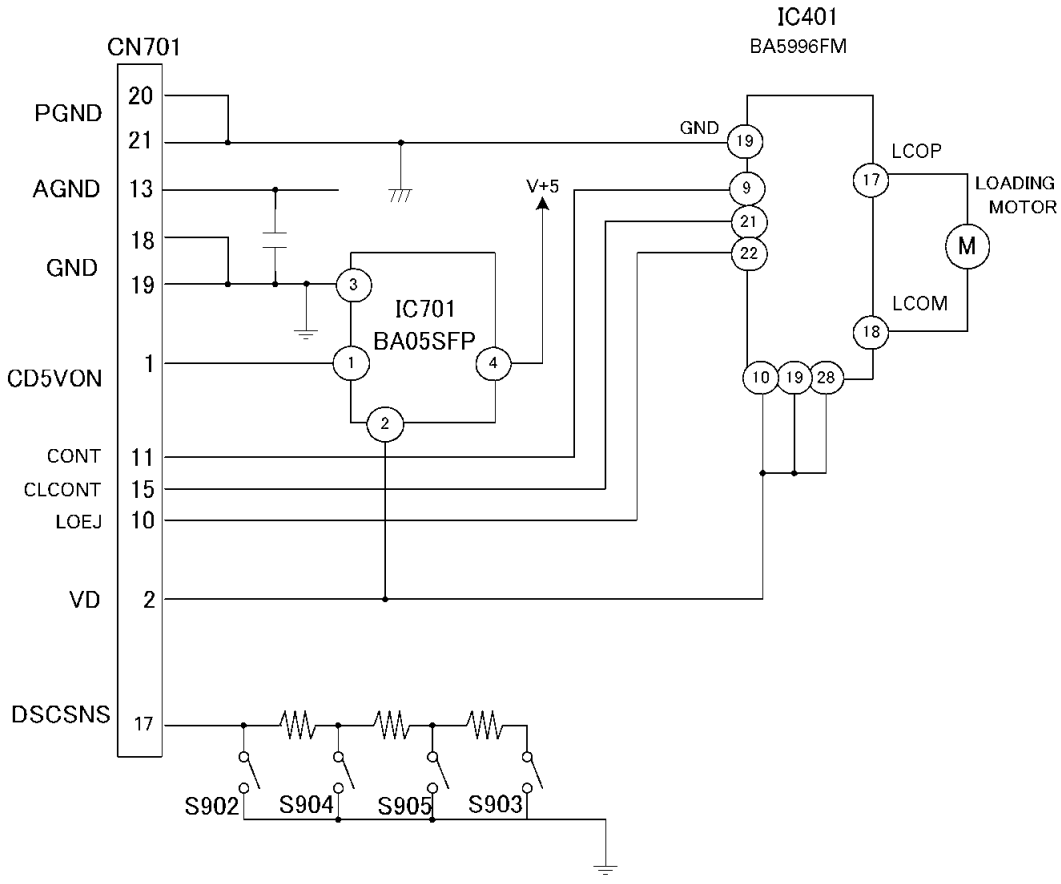


Fig. 22: Block diagram of circuits in Power supply/Loading system

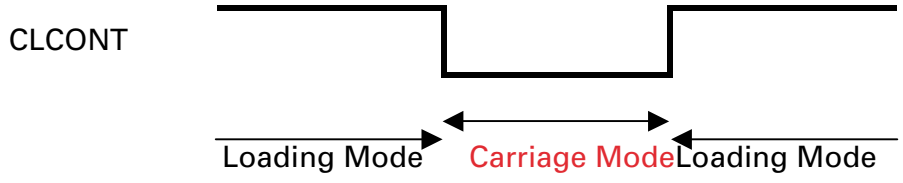


Fig. 23: Switching of LOADING/CARRIAGE mode

LOAD/EJECT actions are controlled through condition-changes of four switches, namely, the Clamp switch on the mechanical unit and three switches on the Control unit (Combination of ON/OFF conditions of each one of these 4 switches is called "status" as a whole). That is, DSCSNS voltage changes according to ON/OFF conditions of these switches, and controls are performed through such change of voltage. Accordingly, to control this voltage, the microcomputer judges each status (A to E) using its A/D port. Also, it judges whether the disk is 8cm-disk or 12cm-disk through such change of status, too.
Fig. 24 shows each status and Fig. 25 shows transition of status.

DETECTION SWITCH STATUS AT THE TIME OF LOAD EJECTION

STATUS	A	B	C	D	E
SW1(S903)	ON	OFF	OFF	OFF	ON
SW2(S905)	OFF	OFF	ON	ON	OFF
SW3(S904)	OFF	OFF	OFF	ON	OFF
SW4(S902)	OFF	OFF	OFF	OFF	ON
MECH. STATUS	NO DISK				CLAMP

Fig. 24: DSCSNS status

LOAD EJECTION OPERATING STATUS TRANSITION DIAGRAM

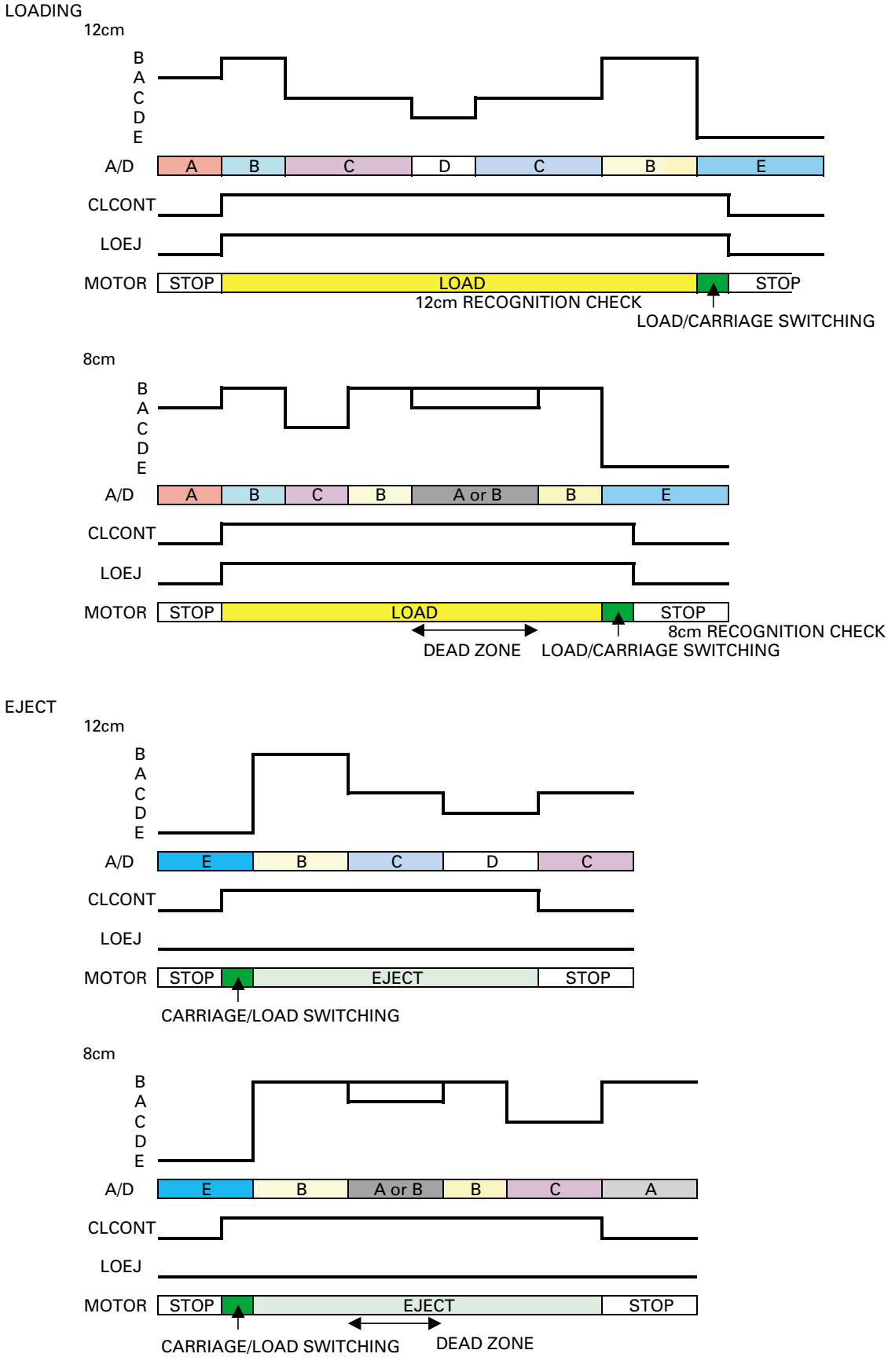
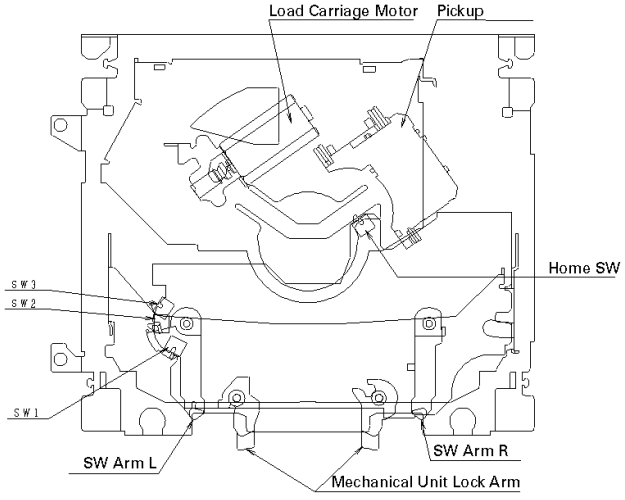


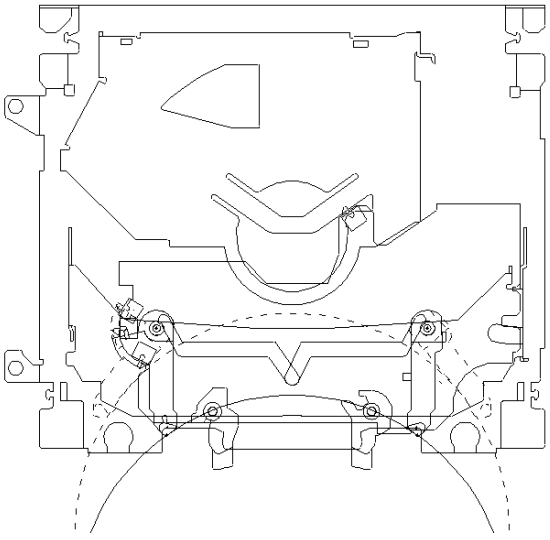
Fig. 25: Transition of loading actions in correlation to status-change

2. MECHANISM DESCRIPTIONS

● Loading actions

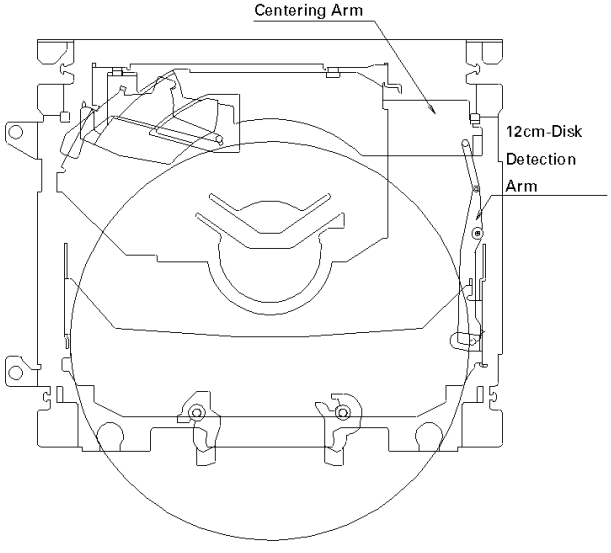
1. When a disk is inserted, SW Arm L and R rotate. Due to the rotation of Arm L, SW1 is switched from ON to OFF and the Load Carriage Motor starts.
2. If the disk is 12cm-disk, when it is carried to the position shown with the dotted line in the drawing, SW 3 switches to ON due to such rotation of Arm L. Then, the microcomputer judges that the disk is 12cm-disk.
3. In case of 8cm-disk, the disk cannot reach such dotted line position, and from such limitation of approach, the microcomputer judges that the disk is 8cm-disk and simply triggers clamp actions.
   (Movement of SW Arm L and R are connected together. So, if pushing force is fed to only one arm, the distance between tow arms cannot be widened beyond the specific degree, because the coupling part is locked in such case.)

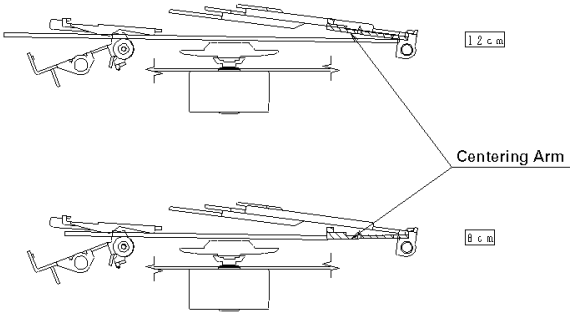




● Disk centering mechanism

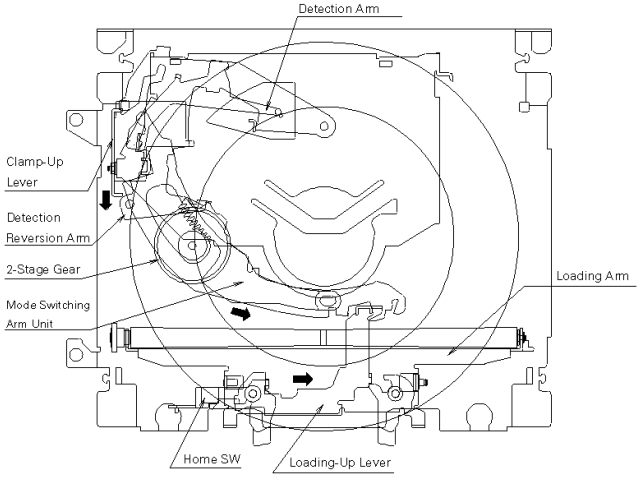
1. In case of 12cm-disk, the 12cm-Disk Detection Arm rotates, and with such rotation, it raises the Centering Arms to retreat the arms from disk's trace. The disk passes through under the arms, and at the inner part, it is centered.
2. In case of 8cm-disk, it is just centered at the position where its edge touches the front portion of the Centering Arm.

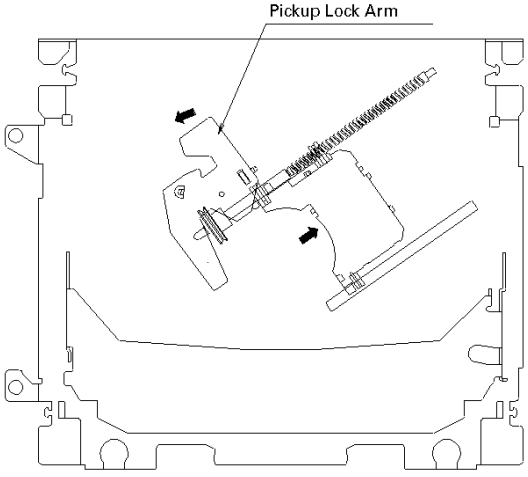




● Clamp actions

1. When centering of 12 or 8cm-disk onto the Spindle is completed, the Detection Arm starts driving.
2. Then, the Detection Arm, via the Detection Reversion Arm, triggers driving of the Plunging Rack, which is on the Mode Switching Arm unit, in order to engage the rack with the 2-Stage Gear.
3. With such engaging, the Mode Switching Arm rotates, and with the rotation, slides the Clamp-Up Lever and pushes down the Clamp Arm. At the same time, the Mode Switching Arm slides the Loading-Up lever, and separates the Loading Arm from the disk. Also, the Loading-Up Lever rotates the Mechanics Lock Arm, releases the Mechanics Lock, and switches on the Clamp SW. Now, at this position (the position where the disk is situated when the Clamp SW is switched on), clamping actions are completed.
4. Then, upon the completion of clamping actions, the Plunging Rack lets the Pickup Lock Arm start rotating, and this Pickup Lock Arm, with such rotation, feeds the Pickup to Feed Screw's screw portion. Now, Carriage actions start.





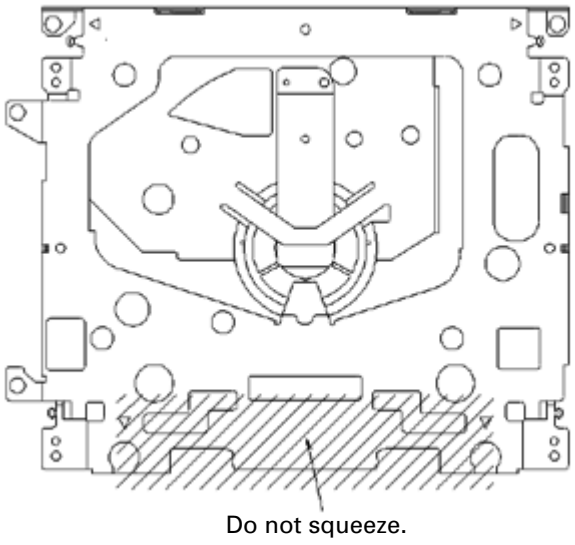
● Eject actions

1. Eject actions start when the Pickup is fed to the position inner than "Home SW ON" point in the internal circumference of the circle, caused by backward rotation of the Load Carriage Motor. Eject actions follow the foregoing procedures (steps taken in loading, centering and clamping actions), but each action in those steps is performed in reversed manner.
2. In case of 12cm-disk, Eject is completed when SW3 completes its condition- transition of OFF → ON → OFF.
3. For 8cm-disk, Eject is completed when SW2 completes its condition-transition of OFF → ON → OFF.

3. DISASSEMBLY

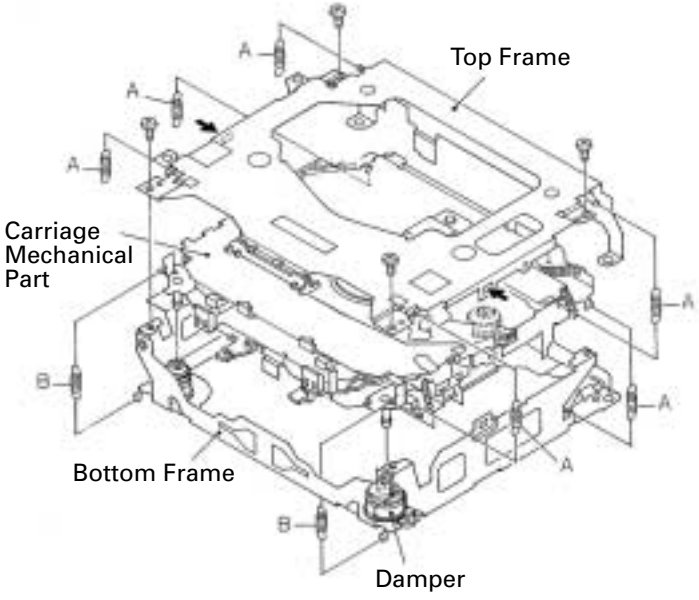
● How to hold the Mechanical Unit

1. Hold the top and bottom frame.
2. Do not squeeze top frame's front portion too tight, because it is fragile.



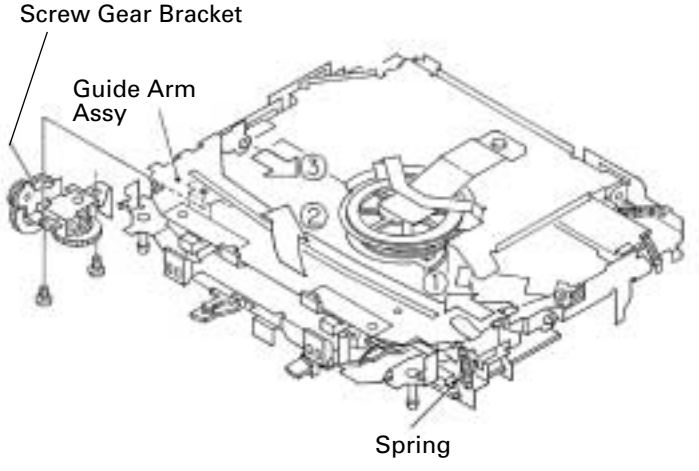
● How to remove the Top and Bottom Frame

1. When the disk is "clamp" state, unlock Spring A (6 pieces) and Spring B (2 pieces), and unscrew screws (4 pieces).
2. Unlock each 1 of pawl at the both side of the frame, then remove the top frame.
3. Remove the Carriage Mechanical part in such way that; you remove the mechanical part from 3 pieces of Damper while slowly pulling up the part.
4. Now, the top frame has been removed, and under this state, fix the genuine Connector again, and eject the disk.
   (Caution)
   When you reassemble the Carriage Mechanical part, apply a bit of alcohol to Dampers.



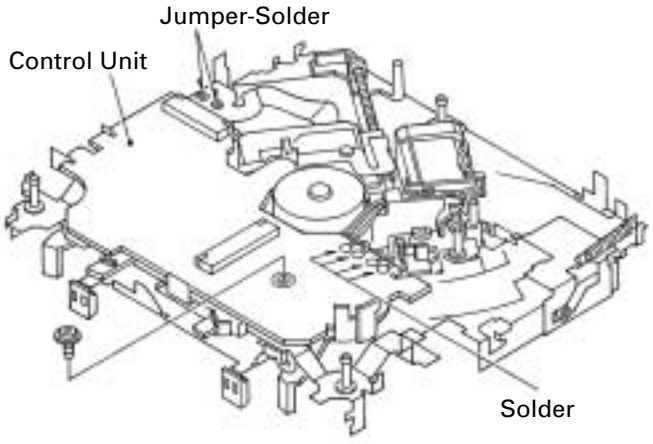
● How to remove the Guide Arm Assy

1. Unlock the spring (1 piece) at the right side of the assembly.
2. Unscrew screws (2 pieces), then remove the Screw Gear Bracket.
3. Shift the Guide Arm Assy to the left and slowly rotate it to the upper direction.
4. When the Guide Arm Assy rotates approximately 45 degree, shift the Assy to the right side direction and remove it.



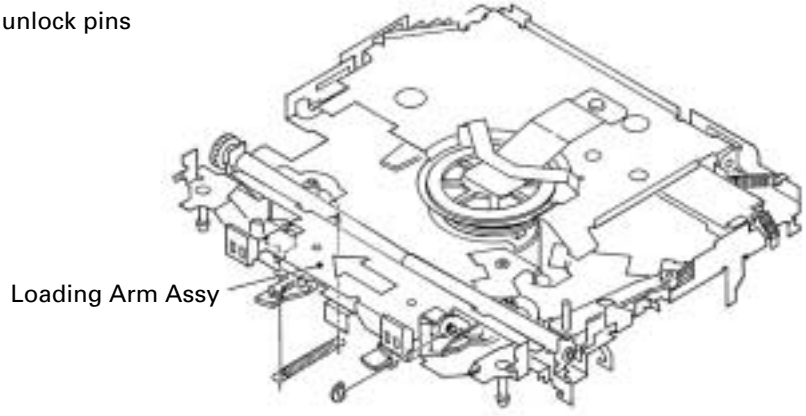
● How to remove the Control Unit

1. Give jumper-solder treatment to the Flexible Wire of the Pickup unit, then remove the wire from the Connector.
2. Remove all 4 points of solder-treatment on the Lead Wire. Also, unscrew the screw(1 piece).
3. Then, Remove the Control unit.
   (Caution)
   Be careful not to damage SW when you reassemble the Control Unit into the device.



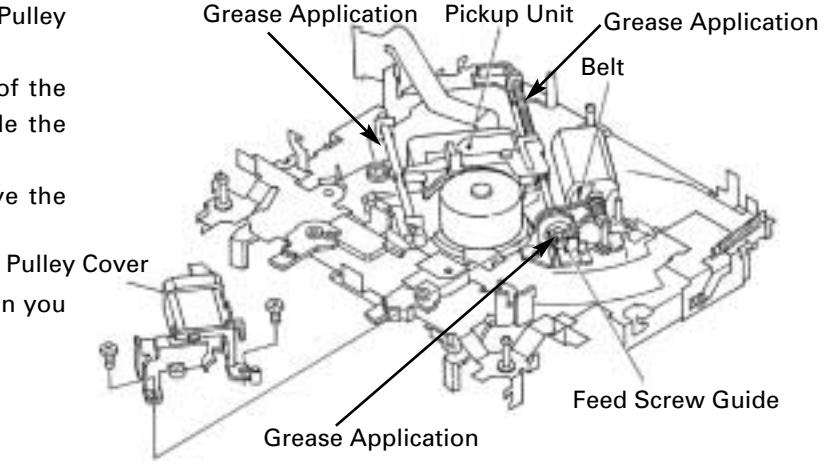
● How to remove the Loading Arm Assy

1. Unlock the spring (1 piece) and remove the E ring (1 piece) of the Fulcrum Shaft.
2. Shift the arm to the left side direction and unlock pins (2 pieces).



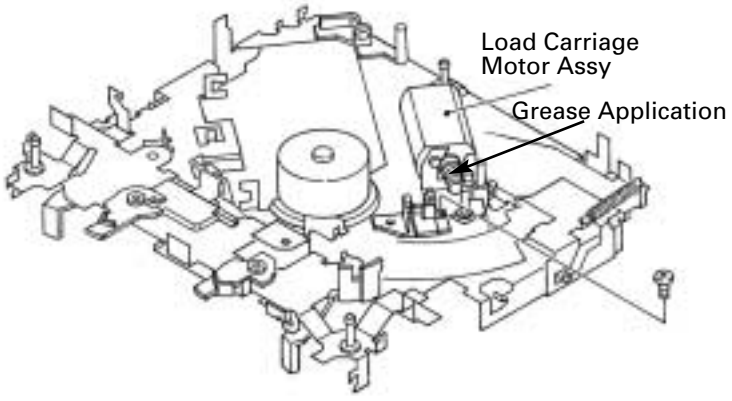
● How to remove the Pickup Unit

1. Unscrew 2 pieces of screws, then remove the Pulley Cover.
2. Remove the Feed Screw unit from the pawl of the Feed Screw Guide (The pawl is located inside the guide).
3. Remove the belt from the Pulley, then remove the Pickup unit.
   (Caution)
   Make sure not to stain the belt with grease when you fix the belt.



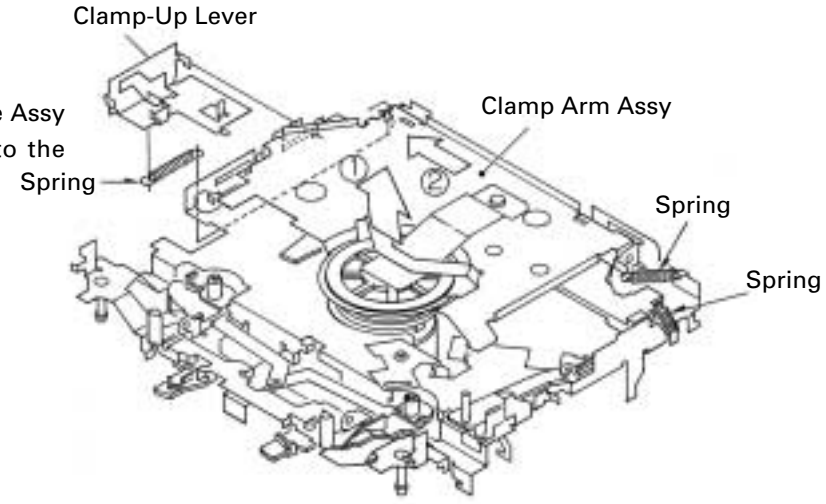
● How to remove the Load Carriage Motor Assy

1. Unscrew the screw (1 piece).
2. Remove the Load Carriage Motor Assy.



● How to remove the Clamp Arm Assy

1. Unlock springs (3 pieces).
2. Remove the Clamp-Up Lever.
3. Remove the Assy in such way that; you shift the Assy to the left side direction while you rotate it to the upper direction slowly.



● How to remove the Spindle Motor

1. Unscrew 2 pieces of screws. Then you can remove the motor.